HYDROLOGY F21/D18B 1 OF 2

STONEGATE
VILLAGE

F21 - D18B

3 PLANS

THIS MEMO IS ACCURATE. CME 7/14/81

El Oso Grande Arroyo

F21.D18a

RECEIVED

JUL 10 1981

CITY ENGINEER

MEMO

TO: Kent M. Whitman

FROM: Cliff A. Spirock

DATE: 7/1/81

SUBJ: Oso Grande Drainage - Recap of Meeting 6/30/81 with Chuck Easterling and Kleston Laws

At the request of Mr. Laws, I participated in a meeting at Chuck Easterling's office to specifically address Oso Grande off-site hydrology and certain on-site design parameters. We also discussed some minor items such as the necessary letter to Dick Heller requesting the allowance to design mountable curb and gutters.

We were advised by Mr. Easterling that Dick Heller continues to wish to approve mountable curb and gutter on a case by case basis. Accordingly, Kleston Laws will write the necessary letter requesting same. Also, I expressed to Mr. Laws that Bob Fosnaugh and Dick Heller should be contacted regarding the street type of sections and provisions of the curb cut ordinance (1903) within Parcel "B" early on. Kleston said he will do so.

Initially, Mr. Laws questioned Chuck about the appropriate cross sections and details for the Bear Canyon arroyo between Eubank and Morris. Kleston was again concerned that C.S.C. show more than one acceptable cross section so that all qualified contractors can bid on the section that best suits their equipment and technique. Chuck mentioned that Rich Leonard has revised the AMAFCA standard, acceptable sections and details for lined channels (amended since we incorporated them in the Design Manual effort) and that we should request the most current copy from him. I will do so.

As to the specific design of the channel, Chuck mentioned that it is basically up to us (following the acceptable sections) and that it would require a minimum 10' bottom width. The crossing structure at Morris should consider having a minimum 6' head room. There are, however, no funds available for any crossing at Morris. Mr. Easterling said he is not particularly concerned with the crossing unless Mr. Bob Fosnaugh is. No specific mention was made for any treatment between Morris and Juan Tabo except as necessary for proper engineering. Chuck Easterling showed us a letter from the Parks and Recreation Dept. concerning Oso Grande Park and that letter indicated that that park site, as is, is questionable for recreation suitability without grading and storm drainage improvements. Mr. Laws said that he may

P.O. Box 1328
Corrales, New Mexico 87048
(505) 897-0000

SURVEYING
LAND PLANNING
CIVIL ENGINEERING
DEVELOPMENT CONSULTANTS

wish to pursue with the Parks and Recreation Department a pre-grading of the channel and park site if he can negotiate credit for park development fees.

The issue of most predominant concern was the efficacy of 280 cubic feet per second (cfs) at Spain and Morris (see 6/25/81 letter, K. Laws). Kleston wanted to be sure that if this was based on "somebody's" approval, that it could be provided to us as a "given" and subject to our scrutiny for engineering calculations as necessary to protect our design element and liability. Easterling mentioned that he was comfortable with the 280 cfs but did not know whether the report was approved. His assistant, Brian, was instructed to research their files and to identify if that is an approved calculation, acceptable to the City, and to also see if there has been any drainage reports filed for changed conditions within the watershed since the date of that report.

Discussion also led to Jake Bordenave's calculation of 30 cfs allowable within Spain Road (capacity) immediately adjacent to the Lutheran Church. This calculation was derived from work that he had done for Dr. Sumner and somewhat contradicts the street capacity of 96.8 cfs (100 year) calculated by others. (Please see Bohannan Huston calculations, 10/1/79.) If Mr. Bordenave is correct, it is indicated that 250 cfs needs to be taken off of Spain.

Another number which was questioned as to it being "given" was the 1,950 cfs discharge from Juan Tabo dam. Unless you disagree (for engineering purposes or liability) this also can be used as specific design criteria.

The intent of the above paragraphs was to determine whether there would be any need for Wood Brothers Homes (and our firm) to submit detailed off-site engineering calculations for upstream hydrology. It is understood that our contract calls for us to prepare a drainage management plan for the subdivision and includes the design of Spain Road storm sewer, not upstream hydrology.

As to the specifics on Spain Road, Mr. Easterling would like "as much taken off Spain Road as soon as possible". Transverse inlets (cattle guard type) are acceptable to Mr. Easterling but are not necessarily acceptable to Dick Heller. They are, however, possible based on past approvals by Heller. Mr. Easterling's preferential type of inlet is similar to a double D (curb opening) but with the upstream grate eliminated. We generally discussed that the Spain Road storm sewer would

probably start at Beebee Street (south side) and then progress westerly with a full intersection design at Rawlins.

Another item discussed was the potential easement for the storm conduit between Morris St. and the Bear Canyon channel. Mr. Easterling made it clear that the easement where the pipe goes underground is per Water Resources Dept. specifications. His concern is with surface treatment and those items which can be maintained by Public Works.

Please also see K. Laws' letter of 6/29. After a discussion with Kleston, it was agreed that Bohannan Huston should fly and map the entirety of the property instead of relying on our firm to do a "spot check" and determine what portions of earth change have occurred. Also, please see City recorded information that I have procured regarding the grade of Morris Street between Montgomery and Spain. A preliminary design grade has already been established and approved but the existing ground conditions may have been affected due to TVI construction and the construction of water supply lines and well collector lines.

c: Kleston Laws

bc: Chuck Easterling ✓

U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
HOUSING - FEDERAL HOUSING COMMISSIONER

CERTIFICATION BY REGISTERED ARCHITECT/ENGINEER OR OTHER PROFESSIONAL

Name of Subdivision	Name of Developer
El Oso Grande	Wood Brothers Homes

I Charles M. Miller, Registered ~~Architect~~/Engineer, or _____, to the best of my knowledge, belief and professional judgement, do hereby certify, that:

1. The attached ~~Working Drawings and Specifications~~ Subsoil Investigation for the Subdivision identified above, which is described as follows; meet HUD subdivision criteria and all applicable local standards. (See Note 1.)

   El Oso Grande Subdivision, Spain Road, N.E. and
   Morris Street, N.E., Albuquerque, New Mexico

2. The ~~Working Drawings and Specifications~~ Subsoil Investigation identified as (See Note 2) above include my approval signature as the Architect/Engineer responsible for their preparation;

3. The proposed construction in accordance with ~~these Working Drawings and Specificatio~~ this Subsoil Investigation (a) is permissible under the applicable zoning, building, housing and other codes, ordinances or regulations, as modified by any waivers obtained from appropriate officials, and (b) complies with Minimum Property Standards and other applicable standards, guidelines and criteria.

complete copy of the ~~Working Drawings and Specifications~~ Subsoil Investigation is attached.

aivers of codes, etc., were obtained as listed in attachment: (See Note 3)

igned		
ame of Professional: Charles M. Miller, P.E.	Address of Business: 3412 Bryn Mawr Drive, N.E. Albuquerque, New Mexico 87107	
elephone Number: (505) 884-0900	License Number: 6018	Date: September 29, 1981

ARNING: Title 18 U.S.C. 1001, provides in part that whoever knowingly and willfully makes or ses a document containing any false, fictitious, or fraudulent statement or entry, in any matt n the jurisdiction of any department or agency of the United States, shall be fined not more han $10,000 or imprisoned for not more than five years or both.

OTES:
1. *List number and type of units, location of property, describe property, etc.*
2. *Identify Drawings and Specifications including information normally found in the Title Block of drawings.*
3. *Identify attachment.*

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 22, 1982

Mr. Chris Weiss
Consultants Terra-Sol, Inc.
1100 Alvarado NE, Suite B
Albuquerque, N.M. 87110

RE: REVISED STONEGATE VILLAGE DRAINAGE AND GRADING PLAN

Dear Chris:

I am writing concerning the referenced plan which was signed by this office on March 18, 1982. We approve the concept of draining the lots to the street; however, in order to evaluate the scheme the following information should be submitted:

1. An as-built survey of the existing facilities.

2. Street flow calculations supporting the proposed scheme.

3. A detailed grading plan for the site.

I apologize for the confusion caused by the communication breakdown in this office. If you, or your client, should have any questions concerning the above request, please call.

Very truly yours,

BGB

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

1$

See F21-D18b

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APR 16 1982
APR 16 1982
ENGINEERING
ENGINEERING

DRAINAGE REPORT INFORMATION SHEET

PROJECT TITLE Drainage / Grading Plan for Stone Gate Village

ZONE ATLAS PAGE NO. F-21 CITY ADDRESS Osuna & Eubank NE

LEGAL ADDRESS Stone Gate Village

ENGINEERING FIRM CTS, Inc CONTACT Chris

ADDRESS 1100 Alvarado NE 87110 PHONE 266-3444

OWNER Entity Corp Suite "B" CONTACT Charlie

ADDRESS — PHONE 299-4012

~~ARCHITECT~~/SURVEYOR Walker Surveying Co CONTACT Steve

ADDRESS — PHONE 843-1026

DATE SUBMITTED 4-16-82

BY CLW

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

F21 - D18B

May 10, 1982

Mr. Chris Weiss
Consultants Terra-Sol
1100 Alvarado NE, Suite B
Albuquerque, N.M. 87110

RE: STONEGATE VILLAGE DRAINAGE REVISION

Dear Chris:

The referenced drainage revision is hereby approved in concept.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BGB/tsl

Stonegate Village
DR

Presley Company Of New Mexico

F21-D18B

December 7, 1982

Rip Orr
City Engineering Department
505 Marquette, N.W.
Albuquerque, New Mexico 87103

Dear Mr. Orr:

The Presley Company will be responsible for moving water meter boxes to line up with property line in accordance with Stonegate Replat.

Sincerely,

PRESLEY COMPANY OF NEW MEXICO

Marvin Fleharty

Marvin M. Fleharty
Sen. VP-Operations

MMF/br

1909 Carlisle Blvd., N.E. • Albuquerque, New Mexico 87110 • (505) 265-5811

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

RECEIVED
APR 12 1983

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

CITY ENGINEER

April 8, 1983

Marvin Fleharty
Presley Company of New Mexico
1909 Carlisle, NE
Albuquerque, New Mexico 87110

Re: 4909 Oso Grande Pl., NE
Lot 19, Stone Gate Village (Z-78-114 amended)
Albuquerque, New Mexico

Dear Mr. Fleharty:

A recent inspection of the above referenced property showed that the on going development does not conform to the approved development site plan. Specifically we are concerned with two aspects of the physical development.

First, we found that a "well" six feet wide by 30 feet in length and approximately six feet deep has been created at the N.W. corner of the lot. The true purpose of the "well" is unknown and not reflected on the approved site plan for lot 19. Finally, we are concerned with the finished pad elevation of lot 19 as compared to lot 15. However this latter concern is being refered to Brian Barnett of City Engineering for further assessment and response.

This office must then request that you make arrangements to either amend the approved development to reflect the "well" or prepare to fully comply with the approved plan. If you wish to initiate an amendment, please do so by contacting Gene Mares, City Planning for review by the Development Review Board no later than April 13, 1983. The issue of the pad elevation will also be addressed at that time. If, however, you wish to comply with the current approved plan, please contact this office by the same deadline for further details.

If you should have any questions, please feel free to call on me.

Very truly yours,

Robert E. Romero
Zoning Enforcement Officer

RER/ddd
xc: Leon Moon
9810 Osuna, NE

Michael L. Danoff, Attorney
604 Chama, NE

Gene Mares, City Planning

Brian Barnett, City Engineering

Academy Engineering, Inc.

5353 Wyoming Blvd. N.E., Suite 3 • Albuquerque, New Mexico 87109 • (505) 821-8008

April 14, 1983

Jack Leaman
Land Use Subsection
Planning Division
City of Albuquerque

Mr. Leaman,

Bob Romero from City Zoning has requested of our client, Presley Company of New Mexico, to have an As-Built Plan processed through the developement Review Board. This plan is for a low retaining wall on Lots 16 and 19 of Stonegate Village.

At this time we would like to initiate the process to have our plan reviewed by the D.R.B. Attached are the necessary plans and applications. We wish to be heard on the 26th of April.

Respectfully,

John Block

John Block

JB/dh

DRB-83-208
4-26-83

LAW OFFICES OF
MICHAEL DANOFF & ASSOCIATES, P. C.

MICHAEL L. DANOFF

604 CHAMA, N. E.
ALBUQUERQUE, NEW MEXICO 87108
(505) 262-2383

RECEIVED
APR 20 1983
CITY ENGINEER

April 18, 1983

OUR FILE NO.

Mr. Richard Heller
Department of Engineering
P.O. Box 1293
City Hall, 4th Floor
Albuquerque, NM 87103

Mr. Brian Burnett
Department of Engineering
P.O. Box 1293
City Hall, 4th Floor
Albuquerque, NM 87103

Mr. Fred O'Geary
Department of Engineering
P.O. Box 1293
City Hall, 4th Floor
Albuquerque, NM 87103

Mr. Marvin Fleharty
Presley Company of New Mexico
1909 Carlisle, N.E.
Albuquerque, NM 87110

Mr. Ralph Stone
Stone Company Realtors and Builders
2701 San Pedro Dr., N.E.
Albuquerque, NM 87110

RE: Leon and Betty Mhoon; 4909 Oso Grande Pl., N.E.; Lot 19, Stone Gate Village

Gentlemen:

I am writing in regard to the above-captioned matter and the fact that I have been advised by Mr. Robert Romero that there will be a hearing on this matter on April 26, 1983, at 9:00 a.m. at City Hall before the Development Review Board regarding various matters, to include the well, which is located behind my clients' property, as well as the measurements for the raised pad elevation of the lots behind my clients' lot. It is my clients' contention that these elevations do not meet the plans and specifications and my clients ask that you show proof that the elevations meet the plans and specifications and that these elevations are proper by all state statutes and municipal ordinances.

My clients feel that the Engineering Department and the City are at fault in not consulting them in regard to this elevation and the fact that it was never represented to them by the developer, the City, or any realtor that there would be such an elevation. My clients would like to see proof of the acceptance of these plans, as well as the fact that these elevations were approved and are allowable by the City engineers and the hydrologists. My clients are quite concerned because this has obviously devalued their

property and will cause future damages.

My clients are now making demand on the Presley Company of New Mexico or any other developer to cease any and all continuation of the building on adjacent lots where the elevation is above my clients' wall, and in particular, directly to the south of their lot, until such time as this matter can be resolved.

My clients would appreciate your addressing yourselves to these matters as soon as practicable. If you do not desire to cease and desist from futher building, please inform this office so that my clients may proceed with all legal remedies available to them. If this office has not heard from you or your legal representatives by Friday, April 22, 1983, my clients will assume you do not plan to cease and desist from further building and will proceed with any and all legal remedies available to them.

If you have any questions, please do not hesitate to contact this office.

Very truly yours,

Michael L. Danoff

MICHAEL L. DANOFF

MLD/lb

cc: Leon and Betty Mhoon

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE April 19, 1983 REF. NO._____

TO: Robert Romero, Zoning Enforcement Officer

FROM: Brian Burnett, Civil Engineer/Hydrology BB

SUBJECT: 4909 OSO GRANDE PL. NE - YOUR LETTER OF APRIL 8, 1983 OF MARVIN FLEHARTY

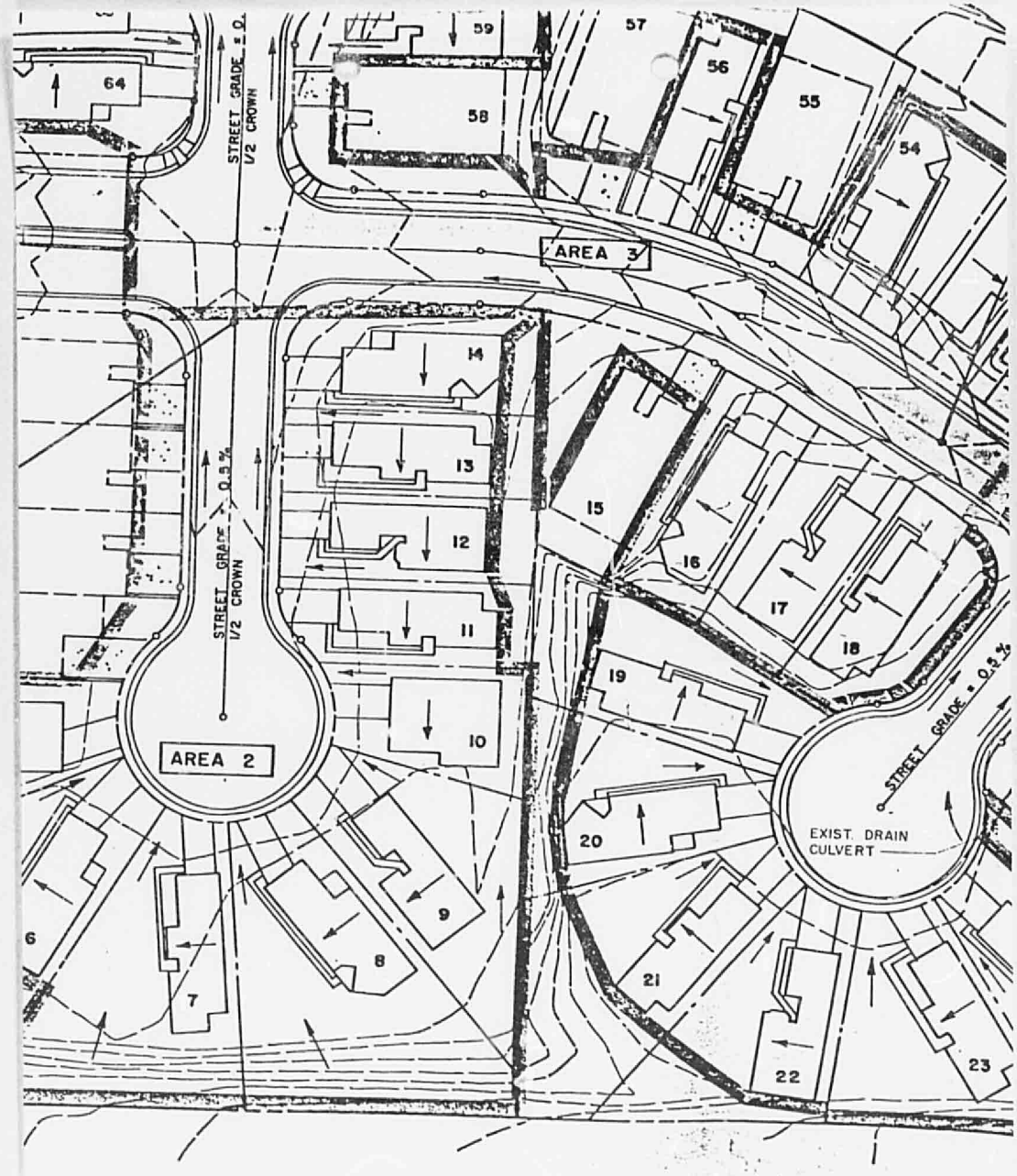
Enclosed are excerpts from the approved drainage/grading plan prepared by Consultants/Terra Sol, Inc. Several items should be noted:

1. The existing subdivision streets have dictated that the finished floor elevations of Lots 19 and 20 be elevated seven feet above the existing pad elevation of Lot 15.

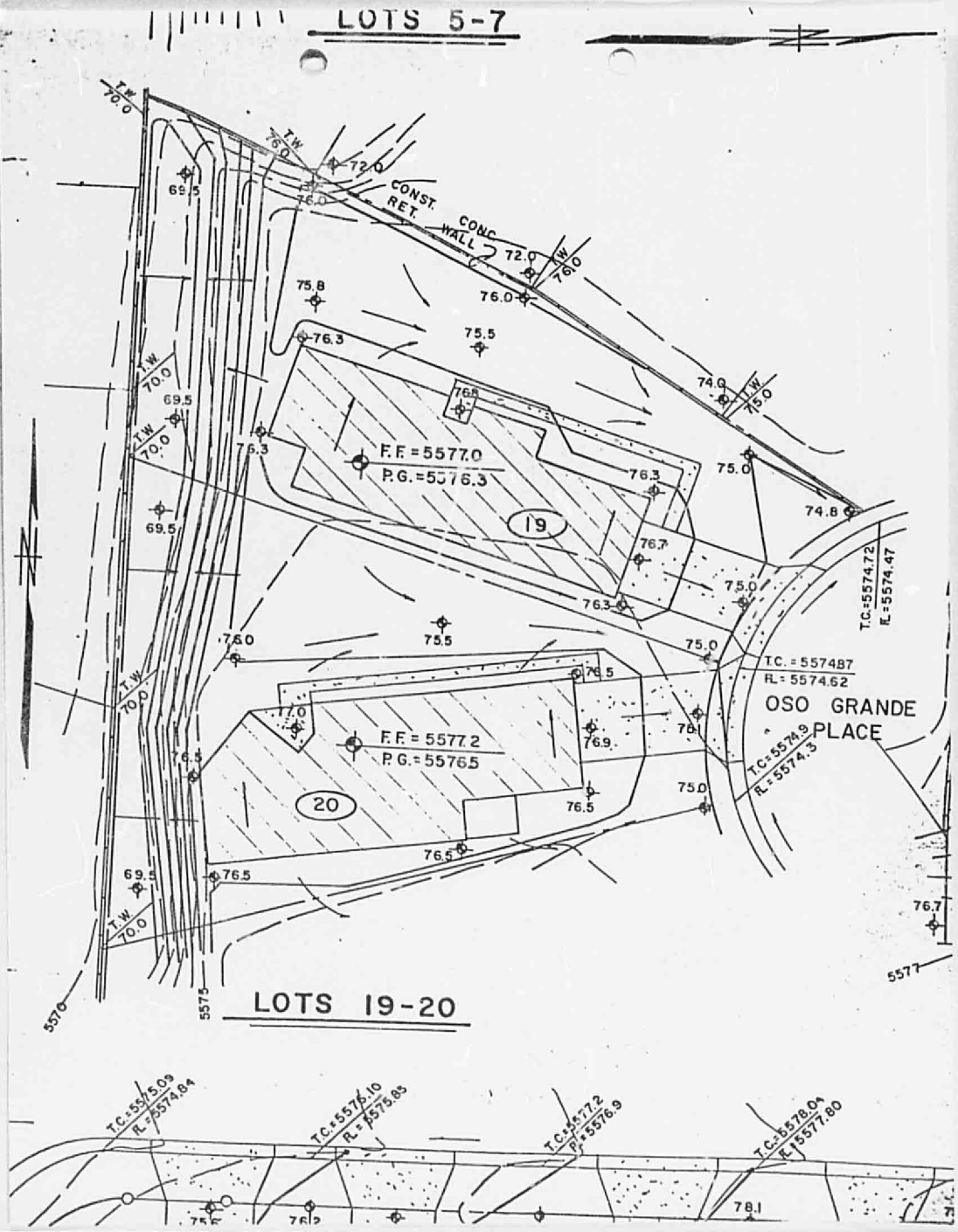
2. As you can see, a drop does exist from the pad to the back lot line on Lots 19 and 20. I assume this is the "well" you refer to. In my earlier conversations with Mr. Moon, he expressed concern with the fact that runoff would pond adjacent to his wall, thus creating a potential hazard to his home. However, we feel that the concern has been satisfactorily mitigated since an additional retaining wall will be constructed adjacent to Mr. Moon's block wall and that the amount of runoff impacting the site is limited to what falls in the rear yard area.

3. It is my understanding that an amended site plan has been filed based on the revised grading/drainage plan.

BGB/tsl



OVERALL DRAINAGE PLAN


LOTS 5-7
CONST. CONC. RET. WALL
F.F. = 5577.0
P.G. = 5576.3
19
F.F. = 5577.2
P.G. = 5576.5
20
T.C. = 5574.87
R.L. = 5574.62
T.C. = 5574.72
R.L. = 5574.47
T.C. = 5574.9
R.L. = 5574.3
OSO GRANDE PLACE
LOTS 19-20
T.C. = 5575.09
R.L. = 5574.84
T.C. = 5576.10
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T.C. = 5577.2
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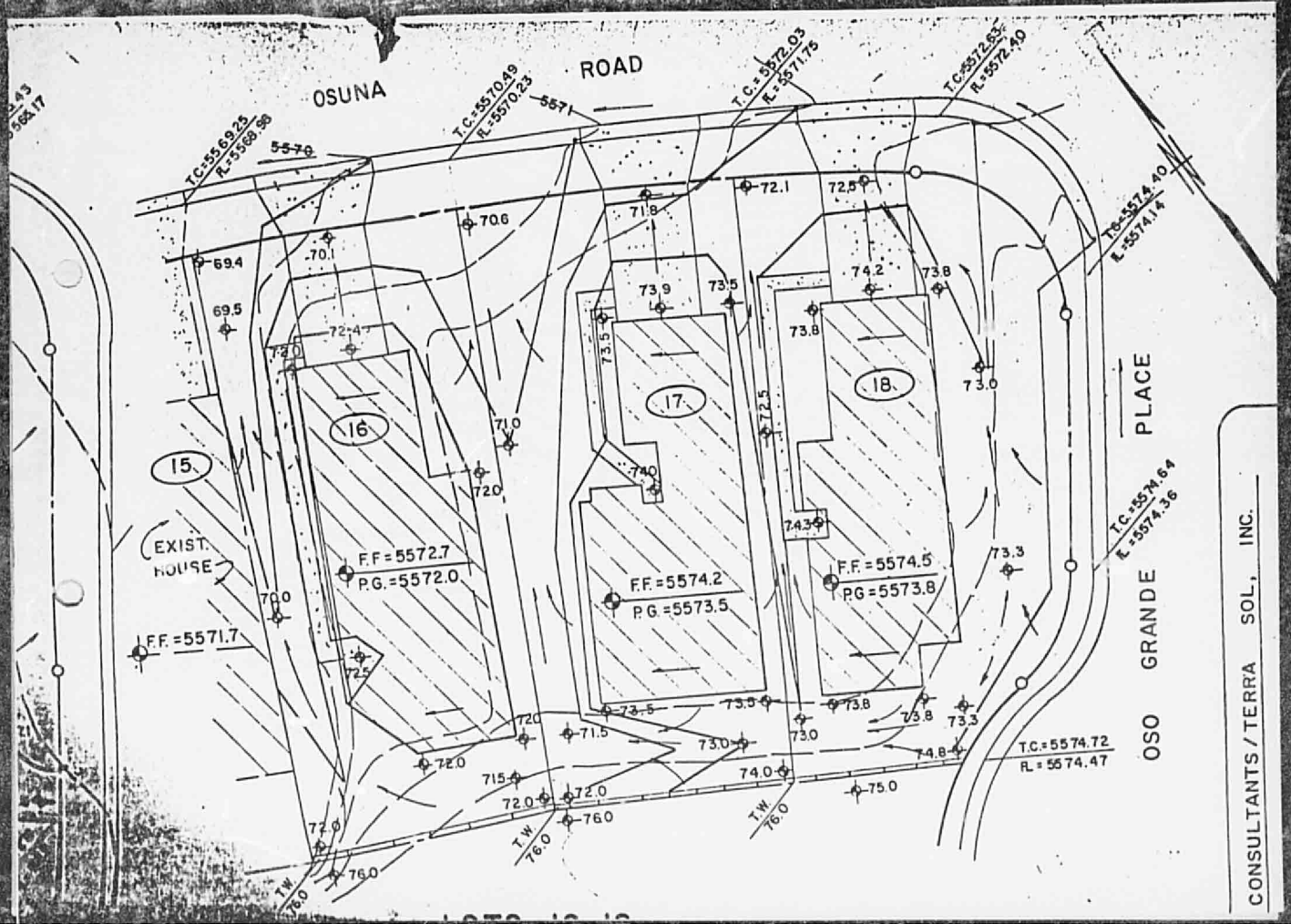
T.C. = 5578.04
R.L. = 5577.80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OSO GRANDE PLACE
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16
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F.F.=5571.7
F.F.=5574.2
P.G.=5573.5
F.F.=5574.5
P.G.=5573.8
T.W. 76.0
CONSULTANTS / TERRA SOL., INC.

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 21, 1983

Mr. Michael Danoff
Michael Danoff & Associates, P.C.
604 Chama N.E.
Albuquerque, N.M. 87108

RE: YOUR LETTER OF APRIL 18, 1983 - 4909 OSO GRANDE PL. N.E., LOT 19, STONEGATE VILLAGE

Dear Mr. Danoff:

I have reviewed your letter along with pertinent information in our files with Mr. Brian Burnett and Mr. Fred Aguirre. Following is an outline of events regarding this project:

1. A Site Development Plan for El Oso Grande Unit 3 (original name) was signed by this office on December 11, 1978. Construction plans for the subdivision were signed in early 1979. Enclosed are copies of these documents. Note that these plans called for the finished flow elevation of Lot 19 to be approximately 4 feet higher than the finished floor elevation of Lot 15 (Elevation of Lot 15: 5571.7; Elevation of Lot 19: 5576.0). The plans also indicate that a majority of Lot 19 was to be drained to a pond in the northwest corner of the site.

2. Construction of Oso Grande Ct., Oso Grande Pl., and Osuna Rd. was completed in late 1979. As you know, only a handfull of units were constructed in late 1979 and early 1980.

3. In early March 1982, Mr. Brian Burnett and Mr. Chris Weiss, Consultants Terra-Sol, Inc., met to discuss the possibility of revising the grading plan such that lots fronting on Oso Grande Place would drain to the streets. Since the City has had poor experience with rear lot ponding as proposed in the original plan, it was felt that this would be an appropriate means of draining the lots. On March 22, 1982 Mr. Burnett contacted Mr. Weiss expressing concurrence with the concept and requested that a revised grading plan be submitted to the Hydrology Section for review.

4. Revised plans were received in this office on April 16, 1982. Enclosed are excerpts from the approved plan set which reflects that the finished flow elevation of Lot 19 was to be 5576.3. This represents a 0.3 ft. difference when compared with the original 1979 plan. Also, it is important to point out that a retaining wall is to be placed between the rear yard of Lot 19 aqnd the existing block wall of Lot 15. Mr. Burnett approved the revised grading plan for the subdivision on May 10, 1982 (enclosed is a copy of the letter).

I would now like to make specific comments regarding your letter:

1. The "well" you refer to in the first paragraph will be the rear yard of Lot 19. In terms of runoff ponding in this corner several points should be made. First, the revised plans significantly reduce the amount of runoff which will pond in the rear yard when compared to the original plans. In other words, the situation is better since the only runoff that ponds in this area is confined to what falls in the rear yard. All of the other runoff generated on the site is conveyed to the street. Secondly, the retaining wall will provide an additional "buffer" between Lot 19 and Lot 15. Due to the small amounts of runoff falling in the rear yard, it is our professional opinion that no damages will occur to either wall.

2. As I outlined earlier, the plans did go through the proper review procedure and written approval was granted by the Hydrlogy office. Also, the plans do meet City's criteria in affect at the time the plans were approved.

3. This office makes every practical effort to coordinate plans with the engineer, client, and neighbors. However, it is not standard practice to have this office contact neighbors each time a plan is submitted. I would like to point out that Mr. Brian Burnett, Mr. Bernie Montoya, and Mr. Fred Aguirre, all City staff, have met with Mr. Mhoon on separate occasions.

4. An approval letter accepting the revised plans is enclosed for your review.

I trust that this letter outlines the City's position regarding this matter. I feel that standard procedures have been followed and that my staff has acted in a professional manner during the process.

Please contact Brian Burnett, or me, if you have any questions.

Very truly yours,

Richard S. Heller

Richard S. Heller
City Engineer

RSH/tsl

cc: Robert Romero, Code Enforcement
Jim Fink, Acting Princ. Asst./City Eng., Hydrology
Chris Weiss, Consultants Terra Sol, Inc.

SPEED - MEMO

PLANNING DIVISION | **CITY OF ALBUQUERQUE**

TO: Academy Engr. agent for Presley Co.

SUBJECT: DRB-83-208

INSTRUCTIONS:

Sender:
1. Write message on left.
2. Retain pink copy for your file.
3. Send white and yellow to addressee.

Recipient:
1. Write reply on right.
2. Retain yellow copy for your records.
3. Return white copy to originator.

MESSAGE:

Development of Lot 19 must comply with approved drainage plans on file with City Hydrology Section.

Request that as-built survey be supplied for Lots 15, 16, and 19 in order to assess compliance with approved plan.

SIGNED [illegible] DATE 4-25-83
CITY ENGINEERING
AMAFCA DESIGNEE

REPLY:

SIGNED _____ DATE _____

82 28101

DRAINAGE EASEMENT

STONEGATE VILLAGE 1449

A ten (10) foot wide drainage easement, centered on the lot line between Lots 51 and 52, for a underground drainage pipe, said easement extending the total length of the lot line, a distance of 100.12 feet.

This is contained in Stonegate Village as the same is shown and designated on the plat thereof recorded in the office of the County Clerk of Bernalillo County, New Mexico, on January 23, 1979, and also shown on that certain Summary Plat filed February 3, 1982, as Document No. 82-6044.

ENTITY CO., PARTNERSHIP

By: Charles Griffin
Charles Griffin, Partner

STATE OF NEW MEXICO
COUNTY OF BERNILILLO

The foregoing instrument was acknowledged before me this 27 day of May, 1982, by Charles Griffin, Partner on behalf of ENTITY CO., Partnership.

My commission expires Jan 30 1985

Janette M. Williams
NOTARY PUBLIC

OFFICIAL SEAL
JANETTE M. WILLIAMS
NOTARY PUBLIC - NEW MEXICO
Notary Bond filed with Secretary of State
My Commission Expires 1-30-85

See Attached Exhibit:

STATE OF NEW MEXICO
COUNTY OF BERNALILLO
FILED FOR RECORD

'82 MAY 27 P3:47

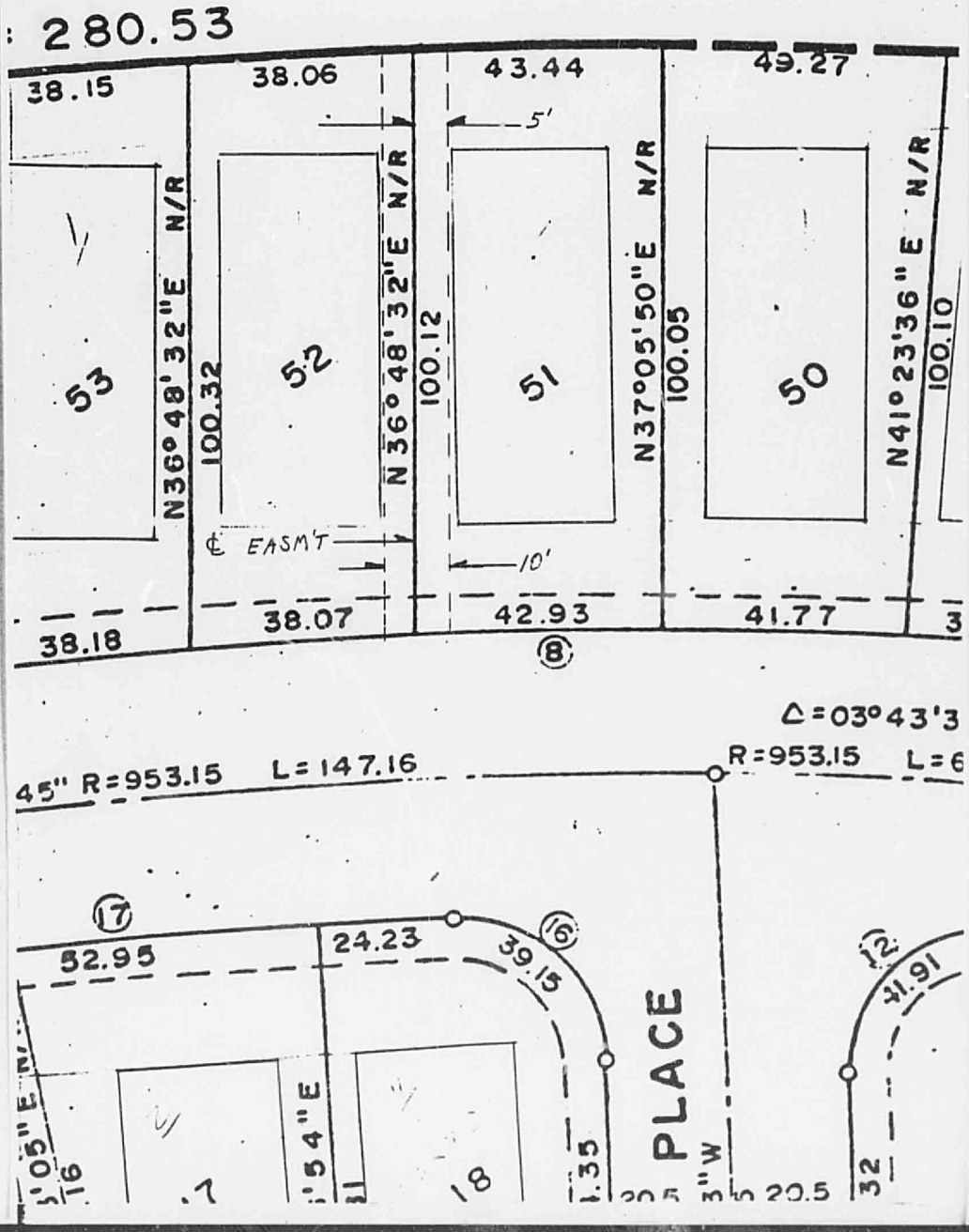
Rec 933 998-999
BK
CO. CLERK AND RECORDER

999

STONEGATE VILLAGE

ALBUQUERQUE, N.M.

SCA



Consulting Engineers and Geologists

F. M. FOX & ASSOCIATES, INC.
3412 BRYN MAWR DRIVE, N.E.
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0900

SUBSOIL INVESTIGATION

EL OSO GRANDE SUBDIVISION

SPAIN ROAD, N.E. & MORRIS STREET, N.E.

ALBUQUERQUE, NEW MEXICO

Prepared for:

Wood Brothers, Inc.

September 2, 1981

Job No. 31102080500

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EARTHWORK SPECIFICATIONS		

GENERAL

This report presents the results of a subsoil investigation conducted at the site of the proposed El Oso Grande Subdivision, located southeast of Spain Road, N.E. and Morris Street, N.E., Albuquerque, New Mexico.

The investigation was made to determine the best types and depths of foundations, allowable soil bearing pressures, groundwater conditions, and any special precautions which should be taken in the design or construction of the residences due to soil conditions.

The conclusions and recommendations presented are based on data gathered during the site investigation, on the results of laboratory testing, and on our experience with similar soil conditions. Data gathered during the field and laboratory investigations are presented in Figures 1 through 4, and Table 1.

PROPOSED CONSTRUCTION AND SITE CONDITIONS

From information supplied by Community Sciences, the site will be developed with one and two story townhouses. It is assumed that the townhouses will be constructed with wood frames and stucco or brick veneer exteriors. No basements are planned, and floors will be concrete slabs-on-grade. It is anticipated that maximum wall loads will be on the order of 1500 pounds per lineal foot.

The site is bounded on the north by Spain Road, N.E., to the east by undeveloped property and Juan Tabo Boulevard, N.E., to the south

by undeveloped property and an arroyo, and to the west by unpaved Morris Street, N.E. The relief on the northern two-thirds of the site consists of hills disected by small drainages. The southern one-fifth of the site is located in the Bear Canyon Arroyo flood plain, and this portion is approximately 20 feet lower in elevation. It should be noted that an AMAFCA retention structure is located east of the site which is designed to control surface runoff in Bear Canyon arroyo. Moderate amounts of cut and fill earthwork will be required to develop the site.

Underground water and sewer utilities run along Morris Street, N.E. at the western boundary of the site. Underground telephone cables parallel Spain Road, N.E. A water line and fire hydrant are located on the site north of test hole #9. Vegetation is present as weeds, grasses and some cacti. Some piles of man-made fill are located across the site, especially along Morris Street, N.E. Trash and construction debris are scattered across the site.

The El Oso Grande Subdivision has been drilled in three phases. Sergent, Hauskins, and Beckwith drilled the northwestern corner of the site on May 25, 1976. F. M. Fox & Associates drilled the northern portion of the site, especially the northeast corner, on October 4, 1978. The test holes discussed in this report were drilled on the southern two-thirds of the site. See Test Hole Location Plan, Figure 1 for test hole identification.

SUBSOIL CONDITIONS

As shown on the Logs of Test Holes, Figure 2, the subsoil conditions across the site are fairly uniform and vary with depth. The test holes generally encountered loose to dense, slightly silty to very silty

sands. Neither groundwater nor bedrock was encountered in any of the test holes to depth 20 feet, the maximum depth of exploration.

The slightly silty to very silty sands encountered across the site exhibit a moderate to high collapse potential upon wetting. Refer to Swell-Consolidation Tests, Figures 3 and 4. The amount of possible settlement from consolidation of these materials can be minimized by means of densification of the soil as well as other positive methods designed to control the moisture content of the foundation soils.

FOUNDATIONS - CONVENTIONAL SPREAD FOOTINGS

Settlement is the governing criteria for foundation design of the proposed residences. Therefore, the residences should be supported on conventional spread footings placed on compacted natural soils or structurally controlled fill if required to meet final gradings plans, and designed for a maximum soil bearing pressure of 1500 pounds per square foot. The man-made fill, trash and construction debris should be removed from the site prior to grading and construction.

Prior to placement of structurally controlled fill, and subsequent to final grading in cut sections, the natural soils should be moistened to optimum moisture content ($\pm$ 2%) for a minimum depth of 5 feet, or for as deep as practicable, and compacted to 95% of maximum density as determined by ASTM D-1557, with a minimum of 20 passes using a heavy vibratory roller. Any fill placed for foundation support should be placed as detailed in the attached Appendix. It is anticipated that on site material will be suitable for placement as structurally controlled fill.

Footings should be proportioned as much as practicable in order to minimize differential settlement. However, a minimum footing width of 16 inches should be maintained. Exterior footings should be placed a minimum of 18 inches below final exterior grade for frost protection. Special care should be taken to insure that prior to footing placement the bearing surfaces are compacted to 95% of maximum density as determined by ASTM D-1557.

INTERIOR FLOOR SLAB CONSTRUCTION

The interior floor slabs should be placed on natural soils or structurally controlled fill. Prior to placement of the slab, and subsequent to the placement of utilities, the natural soils should be moistened to optimum moisture content (± 2%) and compacted to 90% of maximum density as determined by ASTM D-1557. Fill placed for slab support should be compacted in accordance with the specifications as outlined in the attached Appendix.

It is good practice to separate slabs from all bearing members and utility lines to allow their independent movement. However, if desired, slabs may be tied into foundation walls. Where concentrated loads are anticipated, a gravel layer should be placed beneath the slab to help distribute these loads. Frequent joints should be scored in the slab to control the location of any cracking.

EXTERIOR SLABS

Backfill and any soil disturbed around the foundation walls should be well compacted prior to placing any exterior slabs or sidewalks. It is good practice to support small exterior slabs on haunches or to structurally tie them to the foundation to prevent differential settlement.

REINFORCING

Foundations and masonry walls should be well reinforced to minimize the effects of differential movement. Refer to the foundation design for details.

EARTH PRESSURES

The lateral earth pressures for the design of underground structures or retaining walls may be approximated by the following equivalent fluid pressures.

Active Earth Pressure	=	Equivalent Fluid Pressure for a fluid whose density is 40 pcf.
Passive Earth Pressure	=	Equivalent Fluid Pressure for a fluid whose density is 350 pcf.
Earth Pressure at Rest	=	Equivalent Fluid Pressure for a fluid whose density is 60 pcf.

These forces should be assumed to act at the lower third of the stress triangle. It is recommended that a safety factor of 2 be used in designs utilizing these values. These values are based on Rankine theory, and the assumptions of a horizontal backfill surface, a vertical wall, no surcharge, and free-draining backfill material.

BACKFILL AND SURFACE DRAINAGE

The foundation soils should be prevented from being wetted after construction. Backfill around the foundations should be free of trash and construction debris, and should be moistened and well compacted. Only enough water should be added to the backfill material to allow proper compaction. Do not puddle or jet backfill.

The final grade should have a good slope away from the foundation walls on all sides. A minimum of 1 foot of fall in the first 10 feet from all foundation walls is recommended. Drainage from roofs, with or without gutters and downspouts, and all other surface water, should not be allowed to pond in the backfill areas. Backfill adjacent to the foundation walls should be protected from erosion and subsequent ponding of water by suitable means. Any ponding areas required for the control of surface runoff should be located as far from foundation walls as possible, a minimum of 15 feet.

IRRIGATION OF LANDSCAPED AREAS

Do not install sprinkler system lines next to foundation walls. If a sprinkler system is installed, the sprinklers should be placed so

that the spray from the heads under full pressure does not fall within 5 feet of foundation walls. Irrigation should be minimized and controlled. Any planters adjacent to the structure should be watertight, and we recommend employing plants native to the area which require minimal irrigation.

CONSTRUCTION INSPECTION

The recommendations outlined are based on the current plans for the proposed townhouses. If the plans are significantly modified in the future we should be contacted for supplemental recommendations.

In any foundation investigation it is necessary to assume that the subsoil conditions do not vary greatly from the conditions encountered in the test holes. Our experience has shown that variations do exist, and that they are generally apparent in the foundation excavations. For this reason we recommend that we be called to inspect the soils exposed in the foundation excavation prior to construction, and to supervise any fill placement.

F. M. Fox & Associates, Inc.

Steven Brewer

Steven Brewer
Staff Geologist

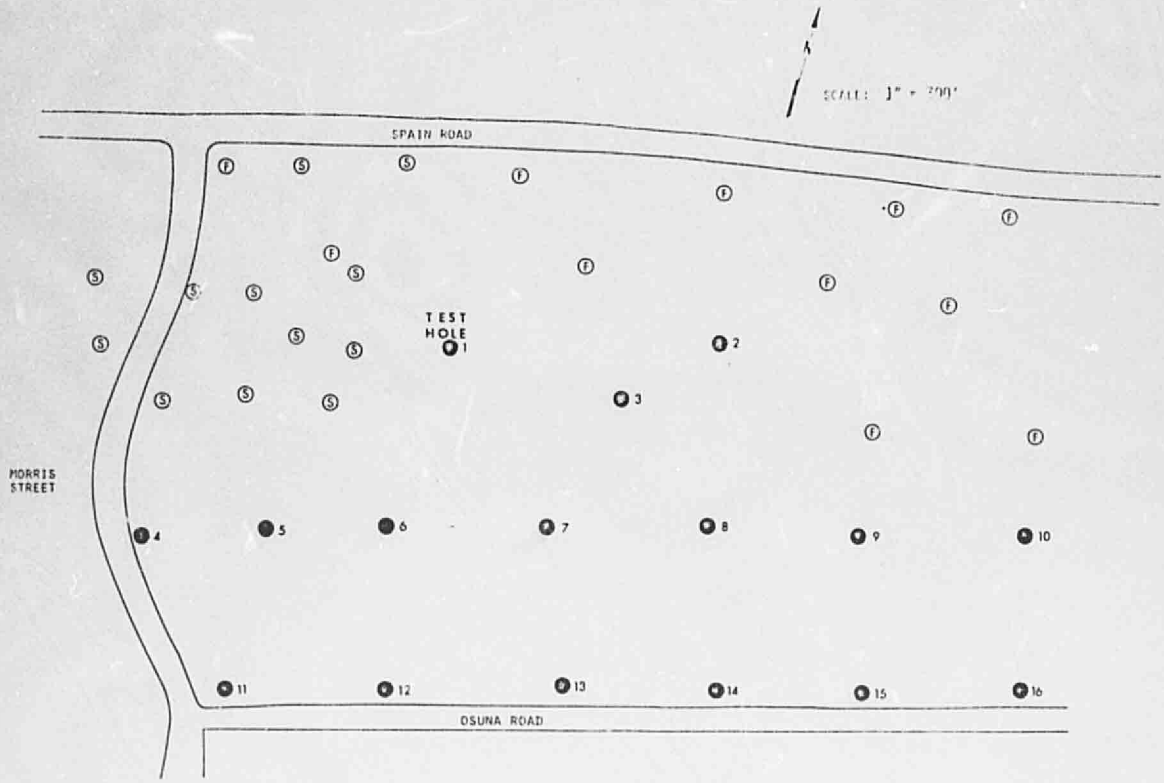
Reviewed by:

Barbara Bridgeman

Barbara Bridgeman, P.E.
Project Geotechnical Engineer

BARBARA BRIDGEMAN
NEW MEXICO
7716
REGISTERED PROFESSIONAL ENGINEER

Copies: FHA (4)
City of Albuquerque (2)
AMAFCA (1)
AMWOOD (4)
Wood Brothers (6)



● INDICATES TEST HOLES DRILLED BY FOX ON AUGUST 18 & 19, 1981.

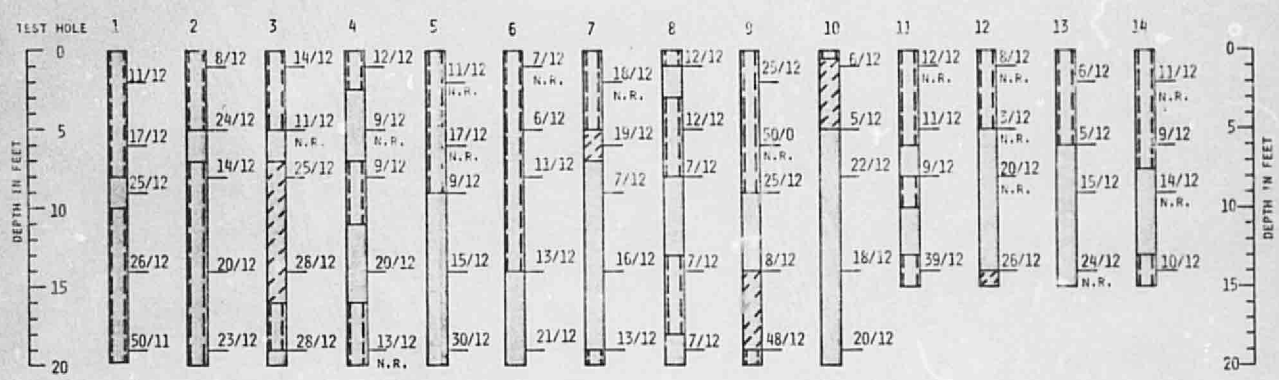
Ⓕ INDICATES TEST HOLES DRILLED BY FOX ON OCTOBER 4, 1978.

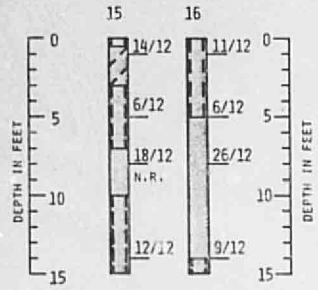
Ⓢ INDICATES TEST HOLES DRILLED BY SERGENT, HAUSKINS & BECKWITH ON MAY 25, 1976.

TEST HOLE LOCATION PLAN

FOX Consulting Engineers and Geologists

Job No. 31102050500 | Date 8/2/81 | Figure





LEGEND

SAND, COARSE TO FINE-GRAINED, SILTY, SOME CALCAREOUS, LOOSE TO DENSE, DRY TO SLIGHTLY MOIST, LIGHT BROWN TO BROWN (SM)

SAND, COARSE TO FINE-GRAINED, SLIGHTLY SILTY, LOOSE TO MEDIUM DENSE, DRY TO SLIGHTLY MOIST, GRAY BROWN TO LIGHT BROWN (SP-SM)

SAND, VERY SILTY, LOOSE TO MEDIUM DENSE, DRY TO SLIGHTLY MOIST, LIGHT BROWN (SM)

N.R. INDICATES NO SAMPLE RECOVERY.

NOTES

1. TEST HOLES WERE DRILLED ON AUGUST 18 AND 19 WITH A 6-INCH DIAMETER HOLLOWSTEM CONTINUOUS FLIGHT POWER AUGER

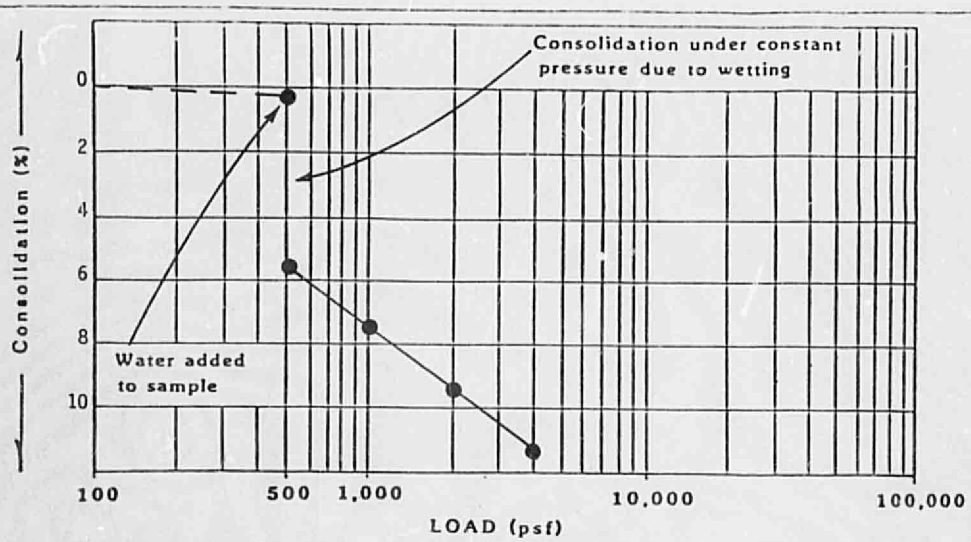
2. (11/12) LOCATION OF STANDARD PENETRATION TEST; INDICATES THAT 11 BLOWS WITH A 140-POUND HAMMER, FALLING 30 INCHES, WERE REQUIRED TO DRIVE A 2-INCH DIAMETER SAMPLER 12 INCHES.

LOGS OF TEST HOLES

FOX Consulting Engineers and Geologists

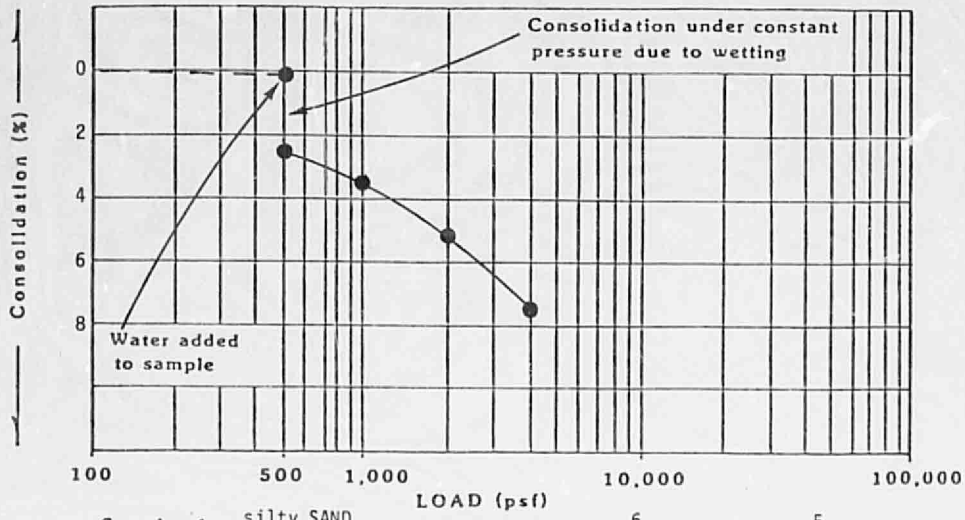
Job No. 31102080500 | Date 9/2/81 | Figure 2

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT



Sample of silty SAND from test hole 4 at depth 8 feet.

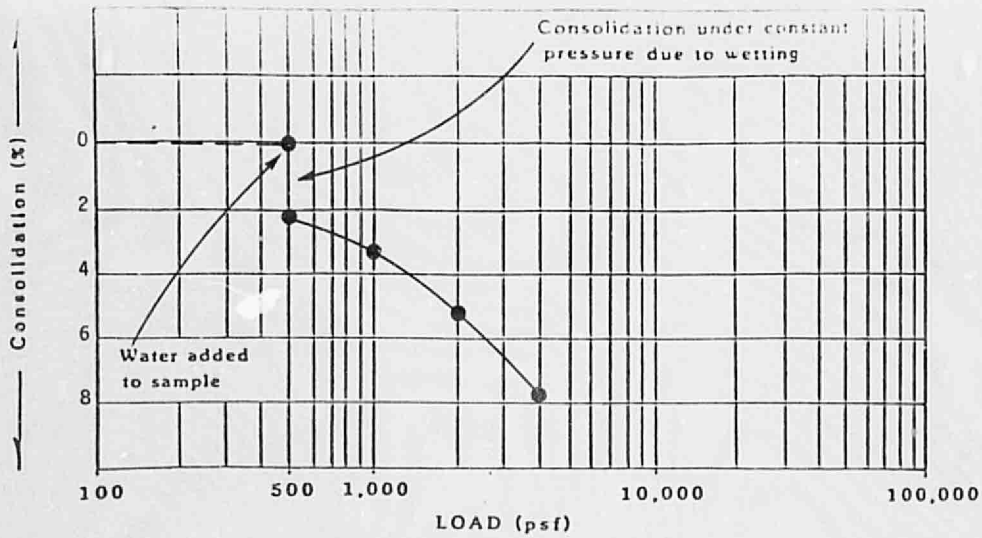
Natural Moisture Content 3.2 % Natural Dry Density 97 pcf.



Sample of silty SAND from test hole 6 at depth 5 feet.

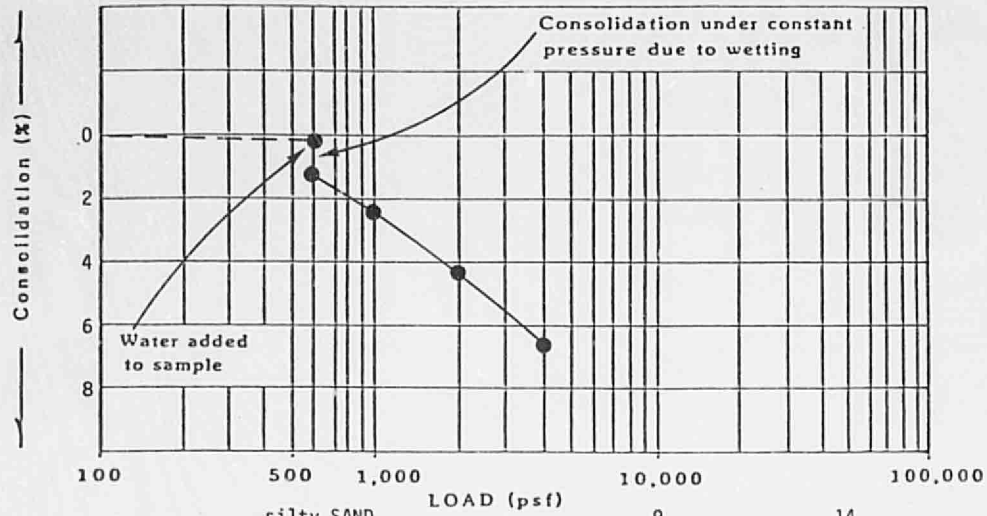
Natural Moisture Content 1.6 % Natural Dry Density 107 pcf.

SWELL - CONSOLIDATION TESTS	Job No: 31102080500
FOX Consulting Engineers and Geologists	Date: September 2, 1981
	Figure 3



Sample of very silty SAND from test hole 7 at depth 8 feet.

Natural Moisture Content 4.3 % Natural Dry Density 104 pcf.



Sample of silty SAND from test hole 9 at depth 14 feet.

Natural Moisture Content 6.4 % Natural Dry Density 108 pcf.

SWELL - CONSOLIDATION TESTS	Job No:	31102080500
FOX Consulting Engineers and Geologists	Date:	September 2, 1981
	Figure	4

SUMMARY OF LABORATORY TEST DATA

Hole No.	Depth of Sample (ft)	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits LL	Atterberg Limits PI	Sieve Analysis % Passing No. 4	No. 10	No. 40	No. 80	No. 200	Soil Description	Remarks
2	1	96	2.6	25	NP	92	78	49	40	24	silty SAND	-
4	8	97	3.2	NV	NP	93	77	63	53	36	silty SAND	Fig. 3
6	5	107	1.6	NV	NP	90	70	46	39	25	silty SAND	Fig. 3
7	8	104	4.3	NV	NP	96	89	79	74	43	very silty SAND	-
8	8	108	1.3	NV	NP	90	57	13	8	4	slightly silty SAND	-
9	14	108	6.4	22	NP	95	87	72	66	37	silty SAND	Fig. 4
13	2	102	1.5	NV	NP	78	55	31	22	13	silty, gravelly SAND	-
14	6	116	1.5	NV	NP	89	66	36	27	15	silty SAND	-
15	5	118	1.2	NV	NP	94	65	30	20	12	silty SAND	-
16	5	112	1.0	NV	NP	75	50	18	10	6	slightly silty SAND	-

NV indicates No Value

NP indicates Non-Plastic

Table 1

APPENDIX

EARTHWORK SPECIFICATIONS

1. GENERAL

The Soils Engineer shall be the Owner's representative to control the earthwork placement, moisture content, and compaction. The Soils Engineer shall approve the materials, the method of placing and compaction, and shall give written approval of the completed fill.

The structurally controlled fill shall be placed and compacted as follows:

2. CLEARING AREA TO BE FILLED

All timber, logs, trees, brush, stumps, trash, sod, matted roots and roots larger than 2 inches in diameter shall be removed, piled, or otherwise disposed of. All rocks, cobbles and boulders larger than 6 inches in diameter shall be removed or otherwise disposed of at the direction of the Soils Engineer.

3. SCARIFYING AREA TO BE FILLED

a. The surface shall be plowed or scarified to a depth of at least 6 inches, and smoothed until the surface is free from rots, hummocks, and other uneven features, which would tend to prevent uniform compaction from the equipment to be used.

b. Where fill is to be placed on hillsides or slopes, the slope of the original ground upon which the fill is to be placed shall be plowed, or scarified deeply. Where the slope ratio of the ground is steeper than 3 horizontal to 1 vertical, the bank shall be stepped or benched.

c. Strippings may be placed along rear lot lines and in rear areas where no foundation or slabs will be constructed. All strippings shall be free of logs, trees, timber, trash and rocks greater than 6 inches. Strippings will be placed subsequent to the placement of all structurally controlled fill, and to a depth no greater than 6 inches.

4. PREPARATION OF AREA TO BE FILLED AND TREATMENT OF CUT SECTIONS

After the foundation for the fill has been cleared, any frozen material removed, and it has been plowed or scarified, or subsequent to final grading in cut sections, the ground surface should be disced or bladed until it is uniform and free from large clods, brougth to optimum moisture content ($\pm$ 2%)

for a minimum depth of 5 feet or for as deep as practicable, and compacted to a minimum of 95% of maximum density as determined by ASTM D-1557, with a minimum of 20 passes using a heavy vibratory roller.

5. FILL MATERIAL

Materials for the fill shall consist of material selected or approved by the Soils Engineer. The materials shall be free of vegetable matter, frozen material and other deleterious substance and shall not contain rocks or lumps which have a diameter of more than 6 inches and shall have a liquid limit not greater than 25 and plasticity index not greater than 12. It is anticipated that borrow from the site will be satisfactory if blended to meet the above requirements.

6. DEPTH AND MIXING OF FILL LAYERS

The selected fill material shall be placed in layers which, when compacted shall not exceed six (6) inches. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to insure uniformity of material in each layer.

7. ROCK

When the fill material includes rock, no large rock shall be allowed to nest and all voids must be carefully filled witn small stoned or earth, properly compacted. No large clods (maximum size 6 inches) will be permitted closer than twelve (12) inches below the finished grade.

8. MOISTURE CONTENT

The fill material shall be compacted at the optimum moisture content (± 2%) specified for the soils. Sufficient laboratory moisture-density relationship tests will be made to determine the optimum moisture content for the various soils encountered in the borrow area. The Contractor may be required to add the necessary moisture to the fill material in the borrow area if, in the opinion of the Soils Engineer, it is not possible to obtain proper and uniform moisture content by adding water to the fill surface.

9. AMOUNT OF COMPACTION

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to not less than 90% of maximum density as determined by ASTM D-1557, except that fill greater than 2 feet in depth placed for slab support or for foundation support, or for the top 6 inches of street subgrade, shall be compacted to 95% of maximum density.

10. COMPACTION OF FILL LAYERS

Compaction shall be by sheepsfoot rollers, segmented - steel - wheeled rollers, multiple - wheel pneumatic rollers, or other types of suitable compaction equipment. Compaction equipment shall be of such design that it will be able to compact the fill to the specified density. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over its entire area and the compaction equipment shall make sufficient trips to insure that the required density has been obtained.

11. COMPACTION OF SLOPES

Fill slopes shall be compacted by means of sheepsfoot or vibratory rollers or other suitable equipment. Compacting operations shall be continued until the slopes are stable, but not too dense for planting and until there is no appreciable amount of loose soil on the slopes. Compacting of the slopes may be done progressively in increments of three to five feet (3' to 5') in fill height, or after the fill is brought to its total height is approved by the Soils Engineer.

12. DENSITY TESTS

Field density tests shall be made by the Soils Engineer on each layer of fill. Sufficient tests will be made to determine the adequacy of the fill. The frequency of testing will be determined by the Soils Engineer in the field depending on the conditions encountered. Where sheepsfoot rollers are used, the soils may be disturbed to a depth of several inches. Density tests shall be performed by ASTM Method D-1556 with 4 or 6-inch sand cone, ASTM Method D-2167 (water balloon) or approved Nuclear Density Devices and Methods.

13. FINISHED SLOPES AND BUILDING PADS

The fill operation shall be continued in six (6) inch compacted layers as specified above, until the fill has been brought to the finished slopes and elevations shown on the accepted plans. Slopes steeper than 3 horizontal to 1 vertical should be protected from erosion.

14. SUPERVISION

Supervision by the Soils Engineer shall be continuous during the fill and compacting operations so that he can certify that the fill was made in accordance with accepted specifications.

15. SEASONAL LIMITS

No fill material shall be placed upon frozen subgrade nor placed,

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spread, or rolled while it is frozen or thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, snow, or frost penetration, fill operations shall not be resumed until the previously placed fill is as specified.

16. NOTICE REGARDING START OF GRADING

Notification shall be submitted to the Owner, the Soils Engineer, and FHA advising them of the start of grading operations at least 3 days in advance of the starting date, and of any resumption dates when grading operations have been stopped for any reason other than adverse weather conditions.

17. REPORT OF FIELD DENSITY TESTS

Density tests made by the Soils Engineer as specified in Density Tests above shall be submitted to the Owner and the Federal Housing Administration.

18. CERTIFICATION REGARDING COMPLETED FILL

The Soils Engineer shall certify that the site was filled with accepted material in accordance with the accepted specifications and give a professional opinion regarding shrinkage or settlement of the fill and the safe load bearing capacity of the fill.

19. CERTIFICATION REGARDING COMPLETED GRADE ELEVATIONS

A Registered Civil Engineer or Land Surveyor shall certify that the general grading has been completed and the resulting grade elevations are in substantial conformity (grade variations not exceeding 0.5 foot) with the previously accepted detailed development plan.

Note 1: This specification complies with Controlled Earthwork Specifications, FHA Data Sheet 79G, Section K, dated June 1965 except for special provisions noted herein.

Note 2: Strippings shall be stockpiled as directed by the Owner.

Note 3: Summary of Compaction Requirements

	Minimum Compaction Requirements
1. Fill greater than 2 feet in total depth placed for slab or foundation support, and the top 6 inches of street subgrade	95%
2. Fill less than 3 feet in total depth placed for slab or foundation support and all other common fill	90%

A DRAINAGE ANALYSIS

for

EL OSO GRANDE, Unit II

Albuquerque, New Mexico

CHRISTOPHER L. REISS
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REGISTERED PROFESSIONAL ENGINEER

Prepared For:

CHAPARRAL CONSTRUCTION CO.

P.O. Box 11234, Sta. E

Albuquerque, New Mexico 87112

October 1978

Drainage Report and Plan

for

El Oso Grande, Unit II

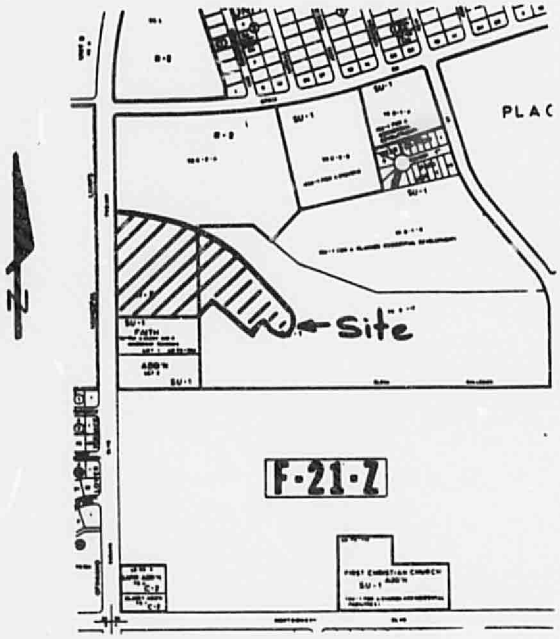
Introduction

At the request of Mr. Glen Luttrell, developer of El Oso Grande, Unit II, a proposed SU-1 townhouse development in Albuquerque, New Mexico, CCIC has investigated the storm drainage for the site. This investigation follows the criteria set forth in the AMAFCA Drainage Resolution 1972-2.

Property Description

The property on which the development is proposed is located in the southwest 1/4 of Section 33, T 11N, R4E (Zone Atlas #F-21-Z). It is more particularly described as adjoining Eubank Blvd. on the east side, at the intersection of Osuna Road and Eubank Blvd. The site contains 9.07 acreas.

Presently, the site is surrounded on the north and west sides by undeveloped land. Eubank Blvd. borders the west side, and the south side borders a church site. The site slopes down to the west with an average 4% grade.



Proposed Development

The proposed development consists of constructing 64 units of townhouse housing, with supporting facilities, streets, and driveways.

Construction features which are pertinent to drainage are as follows:

a. All buildings will have flat roofs, with drain openings only at the rear.

b. Asphalt pavement will be used for the streets. Driveways will be concrete.

c. Drainage of the majority of side yards, roof and rear yards will be accommodated by rear yard ponds and/or dry wells.

Soil

The soil type for this area is Embudo gravelly fine sandy loam and gravelly sandy loam (Em B)[1]. The interpretations of soil properties significant to engineering for ponds and reservoir indicate a moderate permeability in the upper 20 inches (0.6 to 2.0 in/hr.) and very rapid below (> 20 in./hr.)[1] The soil on this property is erosive as well as permeable. The depth to the seasonal high water table is > 5'.

Topographic Map

The topographic map used as a basis for this study and for preparation of the grading drainage plat was compiled from a field survey done by CCIC. This map represents the topography as it now exists.

Existing Drainage

The general drainage pattern of the area is from east to west. The site is located next to the Bear Canyon Arroyo, and was within the original flood plain of the arroyo. Presently, storm runoff from the land upstream of the site is now controlled by the Bear Canyon Juan Tabo Dam. Drainage from the Dam, and/or water draining from the area below the dam, will be collected and routed around the site by a proposed improved channel to be constructed following the original flowline of the arroyo.[2] The channel will have capacity for runoff resulting from a 100 year storm.

---

[1]Soil Survey of Bernalillo County - U.S. Soil Conservation Services, Issued June 1977.

[2]Bear Canyon Arroyo Channel Improvement Plans, Sta 1 + 00 to Sta 12 + 00 By Bohannan - Huston Inc. Anticipated construction of said channel to be prior to the development site.

There are additional off-site drainage areas to the south, but they are relatively small and can be accommodated without difficulty by the proposed layout.

The existing topography of the El Oso Grande property is shown on Figure I. The contours depict the existing Bear Canyon Arroyo which borders the north side of the site and exits the area at Eubank Blvd. Although other minor channels exist, the flow over the remainder of the property is mainly "sheet" flow. The lack of more extensive erosion and formation of small natural channels has been kept to a minimum by the high permeability of the soil.

Offsite drainage to the south of the site is shown on the copy of the orthophoto topographic map, Fig. II, which was supplied by the City.

Runoff Computations

In analyzing the storm runoff to determine the runoff basis of flow generated on the developed site, the Rational Formula, Q = CIA, was used.

Where:

Q = Runoff quantity in cubic feet/second (liters/sec).

A = Contributing area in acres (Hectares)

I = Intensity in inches/hour (cm/hr.)

For a duration equal to the time of accumulation (duration) measured in minutes and obtained from the - Intensity Durations Frequency Curves. (Note: Where the Time of Concentration (Tc) is less than 10 minutes, the intensity value equal to ten minutes was used as shown on the curve for a 100-year storm.

C = Runoff coefficient (No unit). This coefficient represents the integrated effects of infiltration, detention storage, evaporation, retention, flow routing, and interception which all effect the time distribution and peak rate of runoff.

For the proposed developed area, it was desirable to develop a composite runoff coefficient based on the percentage of different types of surface in each subdrainage area.

Different coefficients with respect to surface type are given below.[3] Values have been adjusted for antecedent precipitation conditions.

Streets, walks, and drives	C = 0.95
Roofs	C = 1.0
Lawns, sandy soils, 2 to 7%	C = 0.20

The undeveloped flow rate has been established as Q = CIA = (0.35) (5.4) (9.073 Ac) = 17 cfs.

The following table (Table I) is a summary of the composite "C" values for the developed subdivision.

Table I
EL OSO GRANDE
Composite "C"

Section	Area (Acres)	By Area C=0.20 (AC)	By Area C=0.95 (AC)	Composite "C" Factor (No Unit)
1	1.04	0.67	0.37	0.47
2	0.89	0.54	0.35	0.49
3	2.76	1.26	1.50	0.61
4	0.92	0.45	0.47	0.58

The following table (Table II) summarizes flow rates from their respective areas. Refer to Fig. I for a graphical presentation of the flow rates and their respective departure points.

---

[3]Table 3-2, Urban Storm Drainage Criteria Manual Volume I, Denver Regional Council of Governments.

Table II

EL OSO GRANDE

Estimated Flows - Developed Site

Drainage Area	Tc (Min)	I (in/hr)	C (No Unit)	Area (Ac)	Q (cfs)	Discharge Point
1	18.6	4.33	0.47	1.04	2	Osuna Court
2	21	4.11	0.49	0.89	2	Osuna Court
3	20	4.20	0.61	2.76	7	Bear Canyon Arroyo
4	10	5.40	0.58	0.92	3	Eubank Blvd.
OS-1	10	5.40	0.50	1.61	4	"V" Ditch
OS-2	10	5.40	0.50	1.23	3	End of Osuna Court
OS-3	11	5.25	0.50	0.69	2	Bear Canyon Arroyo
1,2,3,OS-1 OS-2	16.1	4.60	0.54	7.53	19	Bear Canyon Arroyo

Summary

Undeveloped Vol. Runoff = 29,730 $ft.^3$ Undeveloped Q = 17 cfs

Developed Vol. Runoff = 29,600 ft^3 Developed Q = 14 cfs

Drainage Plan

A copy of the proposed drainage plan (Fig. I) is contained in the envelope at the end of the report.

The developed plan utilizes the main access street and the cul-de-sac's as collectors of the runoff from the front yard areas and offsite area south of the site. Flow from the main access street is to be discharged into the Bear Canyon Arroyo at the northwest corner of the site via the street cul-de-sac. This flow will enter the Bear Canyon Channel without detention control.

Surface runoff from the "off-site" property to the south of the site will pass thru the site either as sheet flow or by being collected at specific points for discharge onto the street system of the site.

The first offsite area is a narrow strip of land, varying in width from 5' to 30'; that lies adjacent to lots 6-9 and 21-24. The amount of runoff drainage from this area will be insignificant sheet flow. The grading plan will not alter this pattern. The remaining offsite property, designated

OS-1, OS-2 and OS-3, also drains to the south boundary of the site. These areas are part of a larger area designated to become a City Park. The developer will coordinate the grading of El Oso Grande with the Park Department to achieve the recommended routing of offsite flows to specific points of discharge thru the site.

RECOMMENDATIONS

GRADING

1. The proposed Bear Canyon Arroyo Channel grade line will be cut below the existing flowline adjacent to the site. The finished grade of El Oso Grande adjacent to the proposed channel will be established from those plans. With a design freeboard of 2 feet for the 100 year storm flows, the proposed houses adjacent to the north side of the site can have finished floors established equal to or slightly above the top of channel bank elevations. The remainder of the site will be graded as necessary to establish positive drainage to the northwest corner of the site, and consequently into the channel.

2. The entire area of certain lots will have to be drained to adjoining streets because of grading problems. These lots are No. 1-9, 21-24, 33-35 and lots 61-64. The storm water runoff from these lots will qualify as part of the pre-development flow rate and volume.

3. The remainder of the lots will have to be graded with the rear yard area acting as a retention area for storm runoff draining from the roof and rear yard area. The minimum rear yard dimensions of 36' long by 15' wide would create an unacceptable pond depth of approximately 1' deep. Therefore, it is recommended that the following division of flows for each lot be considered: the rear yard would directly pond all surface runoff - this would require an average depression of 0.5' for a pond area of approximately 130 sf. The roof area would not be allowed to drain directly onto the surface of the yard. Instead, the roof drains would be connected to a pipe system which would carry these flows

directly to a subterranean gravel-infiltration area. The drain system would be a "closed" system between the roof drain and the gravel area. The initial volume of the pit would be designed on a 5 year–6 hour storm. Filled 3/4" to 1-1/2" dia. gravel, this volume would be reduced to 40% of the original. The roof of the townhouse would act as a temporary detention pond until the excess storm water infiltrates into the subsoil. It is recommended that the entrance to the roof drain pipe be covered with a screen of suitable mesh size to keep leaves and other trash out of the pipe and gravel infiltration area. (Fig. III)

Given the soil infiltration rate of greater than 20 in./hr. at the 2' subsoil level under "dry" conditions preceeding the storm, the roof would hold water for approximately 2 hours for a 100 year storm. However, "back-to-back" storms will substantially alter this infiltration rate, which could cause unacceptable ponding depths on the roof. Therefore, it is recommended that the parapet along the front of each townhouse be constructed lower than the remaining parapet, to a maximum height of 3". This would act as an emergency spillway, restricting the roof ponding depth to 3".[4]

4. The locations of the surface pond and the gravel infiltration area should be separated in order to achieve maximum infiltration rates. Of course, the surface pond should be located on the low side of the lot, with the gravel-infiltration at the opposite end of the yard. Each pond-infiltration area should be kept a minimum of 5' away from the house foundation.[5] (Fig. III)

---

[4]The individual builders of the proposed townhouses shall be notified of this requirement with a note on the grading plans. Builders will be responsible for designing the proper live load roof requirements.

[5]These general recommendations are only intended to call the Developer's attention to potential settlement problems. A qualified soils engineer should prepare specific guidelines for ponding waters around structures.

STREETS

1. Roll type curb and gutter is proposed for the internal street system of the site. At 0.5% minimum slope, the streets will have capacity for the estimated flows.

2. A water block, in the form of a small vertical curve, should be designed at the entrance of the site to restrict internal street flows from entering Eubank Blvd.

3. The cul-de-sac area at the northwest corner of the site should be constructed as a no-crown area to help funnel the flows into the channel rundown. The short connecting section of the cul-de-sac street should have a 1/2 crown section.

OFFSITE DRAINAGE IMPROVEMENTS

1. The offsite drainage area adjacent to lots 6-7 and lots 21-24 is small and subject to sheet flow, (100 yr. flow rate = 0.2 cfs, volume of runoff = 390 $ft.^3$). If retaining walls are needed along the south boundary in this area, construct the wall with 3" dia. weep holes located 6'-0' on center. Place a continuous 8" x 8" gravel fill on the south side of the wall to serve as a collection trough for the infiltrated storm flows.

2. The drainage from OS-1 will need to be intercepted along the proposed site boundary and channeled to a collection point at the low point of the area. The method and location of channeling is shown on Fig. I. The flows will be picked up at the NE corner of Lot 24 and routed to the cul-de-sac by way of a concrete lined "V" ditch laid at a minimun 0.5% grade.

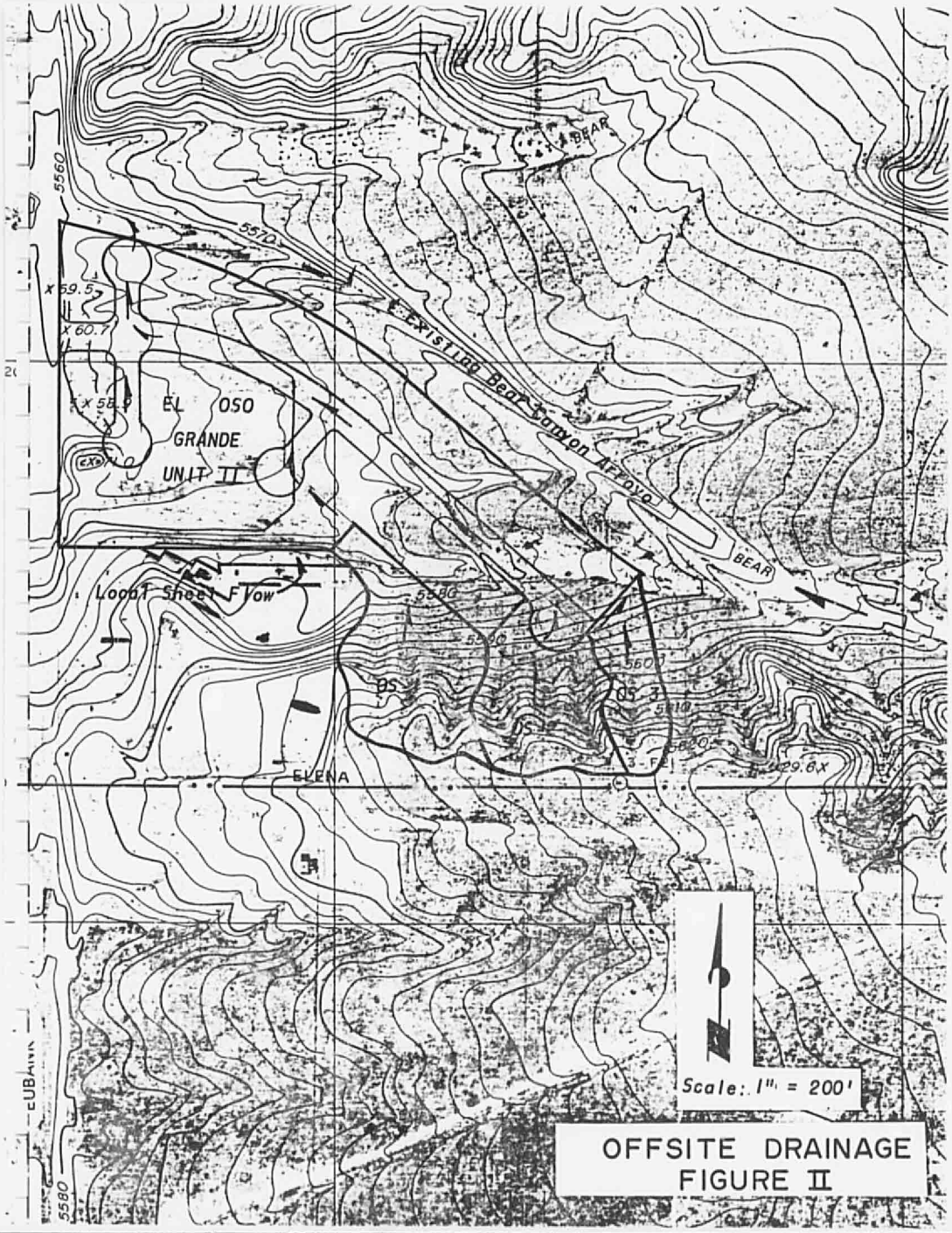
3. The storm runoff from OS-2 will be picked up directly by the end of Osuna Court. No improvements will be needed in this area other than coordination of the street grading with the Park requirements.

4. The drainage from OS-3 will intercept the eastern end of the site and will need to be channeled to the Bear Canyon Arroyo. The method and location of channeling is shown on Fig. I.

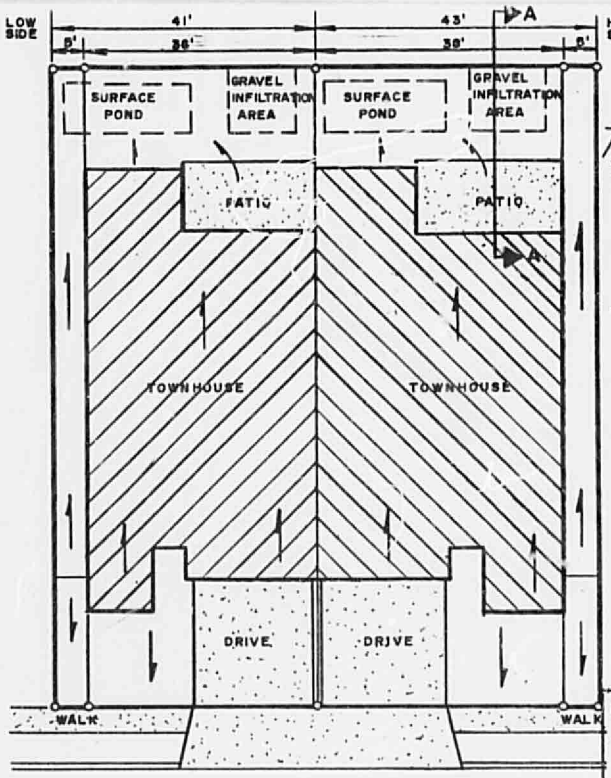
5. The two points of concentrated flow discharge into the Bear Canyon Arroyo will have to be lined to protect the bank from erosion. The cross-section of the proposed rundown is shown on Fig. I. Final design elevations will be coordinated with the approved plans for the Bear Canyon Arroyo. The rundowns will be built as part of the El Oso Grande Improvement Plans because anticipated channel construction will precede the site improvements.

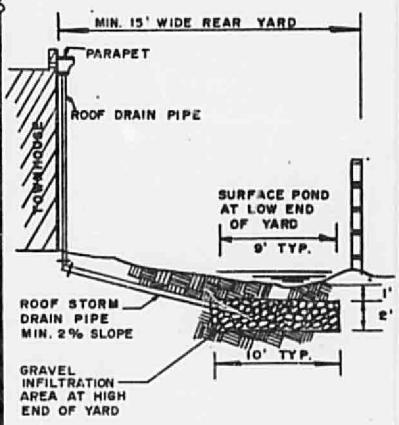
This concludes the recommendations for El Oso Grande Unit II. The following section, the Appendix, contains the design criteria, calculations, and graphs and plats used in arriving at the conclusions presented here.

APPENDIX



OFFSITE DRAINAGE
FIGURE II





SECTION A-A

TYPICAL TOWNHOUSE LAYOUT
Scale: 1" = 20'

DESIGN DATA

"C" Factors Used C = 1.0 (Roof)
C = 0.95 (Patio)
C = 0.20 (Grass)

Rain Fall 5 yr.-6 hr. = 1.5"
100 yr.-6 hr. = 2.6"

Void Ratio for Gravel = 40%

	Lot Size	36'	41'	38'	43'
Surface Pond	Yard Area+ Patio(S.F.)	740	1140	770	1170
	Composite "C"	0.40	0.33	0.39	0.33
	Runoff Vol-Yard 100 yr.-6 hr.Storm	64 C.F.	82 C.F.	65 C.F.	84 C.F.
	Surface Pond at 0.5' Depth	9'x14'	9'x18'	9'x14'	9'x19'
Gravel Infiltration Area	Roof Area(S.F.)	2100	2100	2200	2200
	"C" Factor	1.0	1.0	1.0	1.0
	Roof Runoff 5 yr.-6 hr. Storm	263 C.F.	263 C.F.	275 C.F.	275 C.F.
	100 yr.-6 hr.Storm	455 C.F.	455 C.F.	477 C.F.	477 C.F.
	Gravel Infiltration Size-5 yr.Storm	2'x10'x13'	2'x10'x13'	2'x10'x14'	2'x10'x14'
	Depth Left on Roof for 100 yr.Storm	0.17'	0.17'	0.17'	0.17'
	Time to Drain Roof Pond Excess	< 2 hr.	< 2 hr.	< 2 hr.	< 2 hr.

FIGURE III

RUNOFF COMPUTATIONS

Sheet No. 1

El Oso Grande II
PROJECT

Drainage Area No. 1

Area = 1.04 Acres

0.42 Hectares

C = 0.47

Maximum Overland Flow: L = 180 feet S = 0.03

= 54.9 meters

H = 5 feet

= 1.5 meters

Maximum Channel Flow: L = 200 feet S = 0.03

= 60.9 meters

H = 6 feet

= 1.8 meters

Accumulation Time

Overland Flow: (Figure 2) = 18 min.

Channel Flow:

Velocity = 6 ft/sec Time = $\frac{200 \text{ feet}}{6 \text{ feet/sec} \times 60}$ = 0.6 min.

= 1.8 m/sec. = $\frac{60.9 \text{ meters}}{1.8 \text{ m/sec} \times 60}$

Total Accumulated Time = 18.6 min.

$I = \frac{189}{t+25} = \frac{189}{43.6} = 4.33$ "/hr.

= 11 cm/hr.

Q = CIA = (0.47)(4.33)(1.04) = 2 cfs

= 57 Liters/sec

Date 9-27-78

Com. by CLW Ck. by

RUNOFF COMPUTATIONS

Sheet No. 2

El Oso Grande II
PROJECT

Drainage Area No. 2

Area = 0.89 Acres

0.36 Hectares

C = 0.49

Maximum Overland Flow: L = 160 feet S = 0.01

= 48.8 meters

H = 2 feet

= 0.6 meters

Maximum Channel Flow: L = 140 feet S = 0.005

= 42.7 meters

H = 1 feet

= 0.3 meters

Accumulation Time

Overland Flow: (Figure 2) = 20 min.

Channel Flow:

Velocity = 2.5 ft/sec Time = $\frac{140 \text{ feet}}{2.5 \text{ feet/sec} \times 60}$ = 1 min.

= 0.8 m/sec. = $\frac{42.7 \text{ meters}}{0.8 \text{ m/sec} \times 60}$

Total Accumulated Time = 21 min.

$I = \frac{189}{t+25} = \frac{189}{46} = 4.11$ "/hr.

= 10.4 cm/hr.

Q = CIA = (0.49)(4.11)(0.89) = 2 cfs

= 57 Liters/sec

Date 9-27-78

Com. by CLW Ck. by

RUNOFF COMPUTATIONS

Sheet No. 3

El Oso Grande II
PROJECT

Drainage Area No. 3

Area = 2.76 Acres

1.12 Hectares

C = 0.61

Maximum Overland Flow: L = 140 feet S = 0.02

= 42.7 meters

H = 3 feet

= 0.9 meters

Maximum Channel Flow: L = 1120 feet S = 0.02

= 341.4 meters

H = 25 feet

= 7.6 meters

Accumulation Time

Overland Flow: (Figure 2) = 16 min.

Channel Flow:

Velocity = 4.9 ft/sec Time = $\frac{1120 \text{ feet}}{4.9 \text{ feet/sec} \times 60}$ = 4 min.

= 1.5 m/sec. = $\frac{341.4 \text{ meters}}{1.5 \text{ m/sec} \times 60}$

Total Accumulated Time = 20 min.

$I = \frac{189}{t+25} = \frac{189}{45}$ = 4.2 "/hr.

= 10.7 cm/hr.

Q = CIA = (0.61)(4.2)(2.76) = 7 cfs

= 198 Liters/sec

Date 9-27-78

Com. by CLW Ck. by

RUNOFF COMPUTATIONS

Sheet No. 4

El Oso Grande II
PROJECT

Drainage Area No. 4

Area = 0.92 Acres

0.37 Hectares

C = 0.58

Maximum Overland Flow: L = 60 feet S = 0.10

= 18.3 meters

H = 6 feet

= 1.8 meters

Maximum Channel Flow: L = 400 feet S = 0.005

= 121.9 meters

H = 2 feet

= 0.6 meters

Accumulation Time

Overland Flow: (Figure 2) = 4 min.

Channel Flow:

Velocity = 4 ft/sec Time = $\frac{400 \text{ feet}}{4 \text{ feet/sec} \times 60}$ = 2 min.

= 1.2 m/sec. = $\frac{121.9 \text{ meters}}{1.2 \text{ m/sec} \times 60}$

Total Accumulated Time = 6 min.

use 10

$I = \frac{189}{t+25} = \frac{189}{35} = 5.4$ "/hr.

= 13.7 cm/hr.

Q = CIA = (0.58)(5.4)(0.92) = 3 cfs

= 85 Liters/sec

Date 9-27-78

Com. by GLW Ck. by

RUNOFF COMPUTATIONS

Sheet No. 5

El Oso Grande II
PROJECT

Drainage Area No. OS-1

Area = 1.61 Acres

0.65 Hectares

C = 0.50

Maximum Overland Flow: L = 260 feet S = 0.10

= 79.3 meters

H = 26 feet

= 7.9 meters

Maximum Channel Flow: L = 240 feet S = 0.04

= 73.2 meters

H = 10 feet

= 3.1 meters

Accumulation Time

Overland Flow: (Figure 2) = 9 min.

Channel Flow:

Velocity = 7.7 ft/sec Time = $\frac{240 \text{ feet}}{7.7 \text{ feet/sec} \times 60}$ = 0.5 min.

= 2.4 m/sec. = $\frac{73.2 \text{ meters}}{2.4 \text{ m/sec} \times 60}$

Total Accumulated Time = 9.5 min.
use 10

I = $\frac{189}{t+25}$ = $\frac{189}{35}$ = 5.4 "/hr.

= 13.7 cm/hr.

Q = CIA = (0.50)(5.4)(1.61) = 4 cfs

= 113 Liters/sec

Date 9-27-78

Com. by CCW Ck. by

RUNOFF COMPUTATIONS

Sheet No. 6

El Oso Grande II
PROJECT

Drainage Area No. OS-2

Area = 1.23 Acres

0.50 Hectares

C = 0.50

Maximum Overland Flow: L = 210 feet S = 0.10

= 64.0 meters

H = 22 feet

= 6.7 meters

Maximum Channel Flow: L = ~ feet S = ~

= _____ meters

H = _____ feet

= _____ meters

Accumulation Time

Overland Flow: (Figure 2) = 8 min.

Channel Flow:

Velocity = _____ ft/sec Time = $\frac{\text{feet}}{\text{feet/sec} \times 60}$ = ~ min.

= _____ m/sec. = $\frac{\text{meters}}{\text{m/sec} \times 60}$

Total Accumulated Time = 8 min.
use 10

$I = \frac{189}{t+25} = \frac{189}{35} = 5.4$ "/hr.

= 13.7 cm/hr.

Q = CIA = (0.50)(5.4)(1.23) = 3 cfs

= 85 Liters/sec

Date 9-27-78

Com. by CLW Ck. by _____

RUNOFF COMPUTATIONS

Sheet No. 7

El Oso Grande II
PROJECT

Drainage Area No. OS-3

Area = 0.69 Acres

0.28 Hectares

C = 0.50

Maximum Overland Flow: L = 330 feet

= 100.6 meters

H = 32 feet

= 9.8 meters

S = 0.10

Maximum Channel Flow: L = ~ feet

= _____ meters

H = _____ feet

= _____ meters

S = ~

Accumulation Time

Overland Flow: (Figure 2) = 11 min.

Channel Flow:

Velocity = _____ ft/sec Time = $\frac{\text{feet}}{\text{feet/sec} \times 60}$ = ~ min.

= _____ m/sec. = $\frac{\text{meters}}{\text{m/sec} \times 60}$

Total Accumulated Time = 11 min.

$I = \frac{189}{t+25} = \frac{189}{36} = 5.25$ "/hr.

= 13.3 cm/hr.

Q = CIA = (0.50)(5.25)(0.69) = 2 cfs

= 57 Liters/sec

Date 9-27-78

Com. by CLW Ck. by _____

Street Capacities

A. Roll Type Curbs (City Std Dwg P-5, 4" mountable C & G)

Street Section = 32' FF, 0.0' overflow

Section	Area	W.P.	N	$Q \times S^{1/2}$
1/2 Crown ~ 2"	8.8 ft^2	50'	0.015	$272.21 \times S^{1/2}$
Full Crown ~ 4"	6 ft^2	50'	0.015	$143.59 \times S^{1/2}$

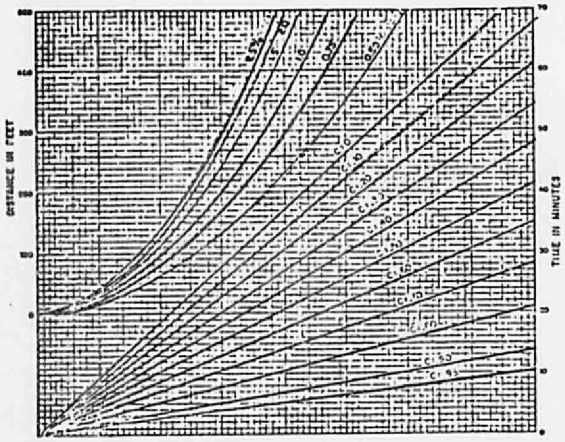
Street Capacity Table

1. 2" Crown

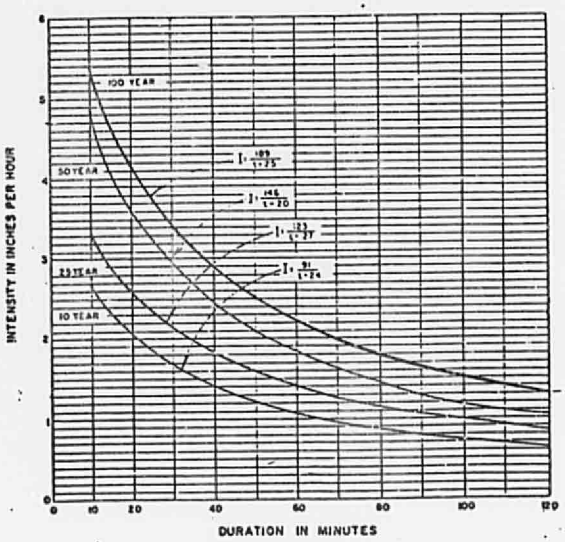
Slope	Street Capacity (cfs)	Velocity (fps)
0.5	19	2.2
0.6	21	2.4
0.8	24	2.8
1.0	27	3.1

2. 4" Crown

Slope	Street Capacity	Velocity
0.5	10	1.7
1.0	14	2.4
1.5	18	2.9
2.0	20	3.4
3.0	25	4.2
4.0	29	4.8



OVERLAND TIME OF FLOW CURVES(7)



INTENSITY DURATION
FREQUENCY CURVES

ALBUQUERQUE AREA-1969

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2322

HYDROLOGY

Sheet No. 3

RUNOFF COMPUTATIONS

El Oso Grande II
PROJECT

Drainage Area No. 3

Area = 2.76 Acres

1.12 Hectares

C = 0.61

Maximum Overland Flow: L = 140 feet S = 0.02

= 42.7 meters

H = 3 feet

= 0.9 meters

Maximum Channel Flow: L = 1120 feet S = 0.02

= 341.4 meters

H = 25 feet

= 7.6 meters

Accumulation Time = 16 min.

Overland Flow: (Figure 2)

Channel Flow:

Velocity = 4.9 ft/sec Time = $\frac{1120 \text{ feet}}{4.9 \text{ feet/sec} \times 60}$ = 4 min.

= 1.5 m/sec. = $\frac{341.4 \text{ meters}}{1.5 \text{ m/sec} \times 60}$

Total Accumulated Time = 20 min.

$i = \frac{189}{t+25} = \frac{189}{45}$ = 4.2 "/hr.

= 10.7 cm/hr.

Q = CIA = (0.61)(4.2)(2.76) = 7 cfs

= 198 Liters/sec

RUNOFF COMPUTATIONS

Sheet No. 4

El Oso Grande II
PROJECT

Drainage Area No. 4

Area = 0.92 Acres

0.37 Hectares

C = 0.58

Maximum Overland Flow: L = 60 feet S = 0.10

= 18.3 meters

H = 6 feet

= 1.8 meters

Maximum Channel Flow: L = 400 feet S = 0.005

= 121.9 meters

H = 2 feet

= 0.6 meters

Accumulation Time = 4 min.

Overland Flow: (Figure 2)

Channel Flow:

Velocity = 4 ft/sec Time = $\frac{400 \text{ feet}}{4 \text{ feet/sec} \times 60}$ = 2 min.

= 1.2 m/sec. = $\frac{121.9 \text{ meters}}{1.2 \text{ m/sec} \times 60}$

Total Accumulated Time = 6 min.
use 10

$I = \frac{189}{t+25} = \frac{189}{35}$ = 5.4 "/hr.

= 13.7 cm/hr.

Q = CIA = (0.58)(5.4)(0.92) = 3 cfs

= 85 Liters/sec

Date 9-27-78

Com. by GLW Ck. by

RUNOFF COMPUTATIONS

Sheet No. 5

El Oso Grande II
PROJECT

Drainage Area No. OS-1

Area = 1.61 Acres

0.65 Hectares

C = 0.50

Maximum Overland Flow: L = 260 feet S = 0.10

= 79.3 meters

H = 26 feet

= 7.9 meters

Maximum Channel Flow: L = 240 feet S = 0.04

= 73.2 meters

H = 10 feet

= 3.1 meters

Accumulation Time = 9 min.

Overland Flow: (Figure 2)

Channel Flow:

Velocity = 7.7 ft/sec Time = $\frac{240 \text{ feet}}{7.7 \text{ feet/sec} \times 60}$ = 0.5 min.

= 2.4 m/sec. = $\frac{73.2 \text{ meters}}{2.4 \text{ m/sec} \times 60}$

Total Accumulated Time = 9.5 min.
use 10

$I = \frac{189}{t+25} = \frac{189}{35}$ = 5.4 "/hr.

= 13.7 cm/hr.

Q = CIA = (0.50)(5.4)(1.61) = 4 cfs

= 113 Liters/sec

Date 9-27-78

Com. by CLW

Ck. by

Sheet No. 6

RUNOFF COMPUTATIONS

El Oso Grande II
PROJECT

Drainage Area No. OS-2

Area = 1.23 Acres

0.50 Hectares

C = 0.50

Maximum Overland Flow: L = 210 feet S = 0.10

= 64.0 meters

H = 22 feet

= 6.7 meters

Maximum Channel Flow: L = ~ feet S = ~

= _____ meters

H = _____ feet

= _____ meters

Accumulation Time = 8 min.

Overland Flow: (Figure 2)

Channel Flow:

Velocity = _____ ft/sec Time = $\frac{\text{feet}}{\text{feet/sec} \times 60}$ = ~ min.

= _____ m/sec. = $\frac{\text{meters}}{\text{m/sec} \times 60}$

Total Accumulated Time = 8 min.
use 10

$I = \frac{189}{t+25} = \frac{189}{35} = 5.4$ "/hr.

= 13.7 cm/hr.

Q = CIA = (0.50)(5.4)(1.23) = 3 cfs

= 85 Liters/sec

Date 9-27-78

Com. by CLW Ck. by _____

RUNOFF COMPUTATIONS

Sheet No. 7

El Oso Grande II
PROJECT

Drainage Area No. OS-3

Area = 0.69 Acres

0.28 Hectares

C = 0.50

Maximum Overland Flow: L = 330 feet S = 0.10

= 100.6 meters

H = 32 feet

= 9.8 meters

Maximum Channel Flow: L = ~ feet S = ~

= _____ meters

H = _____ feet

= _____ meters

Accumulation Time = 11 min.

Overland Flow: (Figure 2)

Channel Flow:

Velocity = _____ ft/sec Time = $\frac{\text{feet}}{\text{feet/sec} \times 60}$ = ~ min.

= _____ m/sec. = $\frac{\text{meters}}{\text{m/sec} \times 60}$

Total Accumulated Time = 11 min.

$I = \frac{189}{t+25} = \frac{189}{36} = 5.25$ "/hr.

= 13.3 cm/hr.

Q = CIA = (0.50)(5.25)(0.69) = 2 cfs

= 57 Liters/sec

Date 9-27-78

Com. by CLW Ck. by _____

Street Capacities

A. Roll Type Curbs (City Std Dwg P-5, 4" mountable C & G)

Street Section = 32' FF, 0.0' overflow

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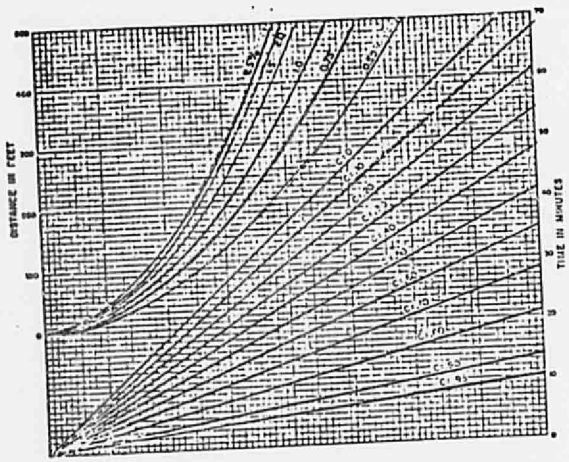
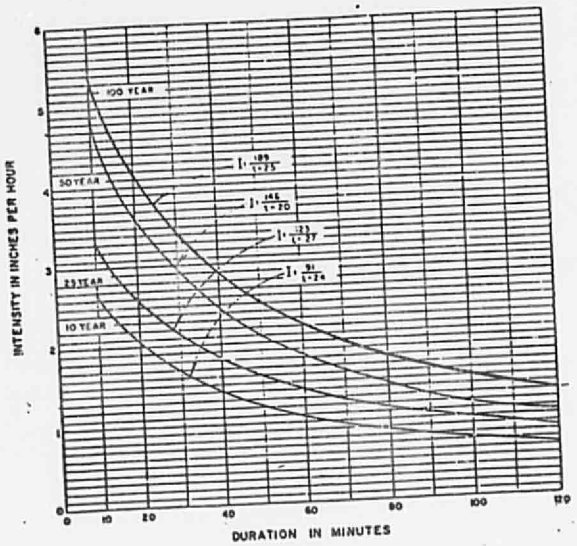
1.0	27	3.1

2. 4" Crown

Slope	Street Capacity	Velocity
0.5	10	1.7
1.0	14	2.4
1.5	18	2.9
2.0	20	3.4
3.0	25	4.2
4.0	29	4.8



OVERLAND TIME OF FLOW CURVES (7)



INTENSITY DURATION
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